3.1.6 Traffic and Transportation/Pedestrian and Bicycle Facilities

This section addresses the potential effects to traffic and circulation associated with construction of the proposed project and compares the relative benefits of each alternative. The traffic and circulation analysis is based on the results of the Traffic Study (May 2011), the Ramp Closure Study (RCS) (June 2011), and the Draft Transportation Management Plan (TMP) (August 2011), and the Supplemental Traffic Study Report Long Beach Area (June 2013) (Supplemental Traffic Study). The Traffic Study evaluates the existing and future traffic flow conditions within the traffic study area within Orange County (defined below in Section 3.1.6.2, Affected Environment). The Supplemental Traffic Study provides the evaluation of the traffic study area within Los Angeles County (defined below in Section 3.1.6.2, Affected Environment). Section 3.1.6.2, Affected Environment, is subdivided into two subsections that present the information for the Orange County and Los Angeles County portions of the traffic study area, respectively. Under the Permanent Impacts subsection of Section 3.1.6.3, Environmental Consequences, the permanent impacts in Orange County and Los Angeles County are presented under separate headings.

The Traffic Study and Supplemental Traffic Study evaluations include, demand, capacity, and LOS for the mainline freeway segments and ramp-freeway junctions, weaving areas, ramp/arterial street intersections, and arterial/arterial street intersections affecting interchange operations. LOS analysis was conducted for the AM and PM peak hours based on the Highway Capacity Manual (HCM) 2000, which states:

> Level of service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six LOS are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver's perception of those conditions. (HCM page 2-2)

The HCM does not provide a method to measure LOS for intersections without a stop sign or traffic signal, such as where a freeway entrance ramp merges into or diverges from an arterial street. A volume-to-capacity (v/c) ratio analysis is provided for such locations. A v/c ratio is a comparison of an amount of traffic on a road with the capacity of that road. A v/c ratio is expressed as a decimal, with values less than 1.00 indicating that volume is less than capacity and values more than 1.00 indicating that volume exceeds capacity. As values approach 1.00,

congestion becomes more severe, with values more than 1.00 indicating severe congestion. Because much of I-405 within the project area operates and is expected in the future to operate at LOS F conditions, v/c ratios are provided as an indicator of the severity of congestion. For future conditions, the v/c ratio is the demand-to-capacity ratio, where the demand volume is used.

Analysis of vehicle queues (i.e., lines of stopped vehicles waiting to proceed) was conducted for AM and PM peak hours at four types of locations for the reasons described below:

1. Left- and right-turn pockets were analyzed to determine if the pockets were of adequate length to contain the anticipated queues.
2. Queuing analysis was conducted for all lanes between closely spaced intersections to determine if traffic would back up from one intersection across an upstream intersection.
3. Anticipated vehicle queuing for AM and PM peak hours at every freeway off-ramp was analyzed to determine if queues might back up onto the freeway mainline.
4. Vehicle storage at freeway on-ramp meters was evaluated to determine if there is adequate storage on the ramp. The evaluation utilized the Caltrans Ramp Meter Design Manual method with a range of potential metering rates.

The analyses were conducted for the following scenarios:

Existing (CEQA Baseline) Traffic Conditions – Year 2009

Opening Year No Build Traffic Conditions – Year 2020

Opening Year Alternative 1 Traffic Conditions – Year 2020

Opening Year Alternative 2 Traffic Conditions – Year 2020

Opening Year Alternative 3 Traffic Conditions – Year 2020

Design Year No Build Traffic Conditions – Year 2040

Design Year Alternative 1 Traffic Conditions – Year 2040

Design Year Alternative 2 Traffic Conditions – Year 2040

Design Year Alternative 3 Traffic Conditions – Year 2040

3.1.6.1 Regulatory Setting

Caltrans, as assigned by FHWA, directs that full consideration should be given to the safe accommodation of pedestrians and bicyclists during the development of federal-aid highway projects (see 23 CFR 652). It further directs that the special needs of the elderly and the disabled must be considered in all federal-aid projects that include pedestrian facilities. When current or anticipated

pedestrian and/or bicycle traffic presents a potential conflict with motor vehicle traffic, every effort must be made to minimize the detrimental effects on all highway users who share the facility.

In July 1999, the U.S. Department of Transportation (USDOT) issued an Accessibility Policy Statement pledging a fully accessible multimodal transportation system. Accessibility in federally assisted programs is governed by USDOT regulations (49 CFR Part 27) implementing Section 504 of the Rehabilitation Act (29 U.S.C. 794). FHWA has enacted regulations for implementation of the 1990 Americans with Disabilities Act (ADA), including a commitment to build transportation facilities that provide equal access for all persons. These regulations require application of the ADA requirements to federal-aid projects, including Transportation Enhancement Activities.

3.1.6.2 Affected Environment

The existing lane configurations, traffic volumes, LOS, and other operational characteristics within the traffic study area are presented in this subsection. This section is divided into two subsections: Orange County and Los Angeles County.

Orange County

Traffic Study Area

The traffic study area within Orange County, shown in Figure 3.1.6-1, focuses on traffic operations of both the I-405 corridor and the freeway ramps at their intersections with arterials, and other signalized arterial intersections that are in the immediate vicinity and have a direct bearing on freeway interchange traffic operations. The proposed project covers a distance of approximately 16 miles along I-405 between SR-73 and I-605. Within the traffic study area in Orange County, 14 freeway segments have been analyzed. These are shown in Figure 3.1.6-1 and include:

1. Bristol Street to Fairview Road
2. Fairview Road to Harbor Boulevard/Hyland Avenue
3. Harbor Boulevard/Hyland Avenue to Euclid Street/Ellis Avenue
4. Euclid Street/Ellis Avenue to Brookhurst Street/Talbert Avenue
5. Brookhurst Street/Talbert Avenue to Magnolia Street/Warner Avenue
6. Magnolia Street/Warner Avenue to Beach Boulevard/Edinger Avenue
7. Beach Boulevard/Edinger Avenue to Goldenwest Street/Bolsa Avenue
8. Goldenwest Street/Bolsa Avenue to Springdale Street/Westminster Avenue
9. Springdale Street/Westminster Avenue to Bolsa Chica Road/Valley View Street
10. Bolsa Chica Road/Valley View Street to Seal Beach Boulevard

11. Seal Beach Boulevard to I-605
12. I-605 – Katella Avenue to San Gabriel River
13. SR-73 – Bear Street to I-405
14. I-605 – I-405 to Katella Avenue

Within the traffic study area in Orange County, the following local interchange areas have been analyzed:

1. Bristol Street Interchange
2. Fairview Road Interchange (includes South Coast Drive)
3. Harbor Boulevard and Hyland Avenue Interchange (includes Susan Street)
4. Euclid Street and Ellis Avenue Interchange
5. Brookhurst Street and Talbert Avenue Interchange
6. Magnolia Street and Warner Avenue Interchange
7. Beach Boulevard and Edinger Avenue Interchange
8. Golden West Street and Bolsa Avenue Interchange
9. Springdale Avenue and Westminster Avenue Interchange
10. Bolsa Chica Road/Valley View Street and Garden Grove Boulevard Interchange
11. Seal Beach Boulevard Interchange (includes Old Ranch Parkway at Westbound SR-22)
12. Bear Street/SR-73 Interchange
13. Katella Avenue/I-605 Interchange

Additionally, traffic operations at the I-405/I-605/SR-22, I-405/SR-22 East, and I-405/SR-73 system interchanges were also evaluated. A list of study intersections, grouped by freeway interchange area, is shown in Table 3.1.6-1. Intersections identified for evaluation include those controlled with traffic signals, as well as stop-controlled or uncontrolled intersections within the study area in Orange County.

To simplify the comparison of future conditions and alternatives, I-405 within the area of proposed widening was divided into three segments (referred to as "study segments" hereafter): SR-73 to Brookhurst Street, Brookhurst Street to SR-22 East, and SR-22 East to I-605. This segmentation is generally based on the similarity of lane cross section by segment. The segment from SR-73 to Brookhurst Street is characterized by lane drops and adds. The segment from Brookhurst Street to SR-22 East has a consistent number of lanes in each of the existing and alternative conditions. The segment from SR-22 East to I-605 also has a consistent number of lanes in each condition.

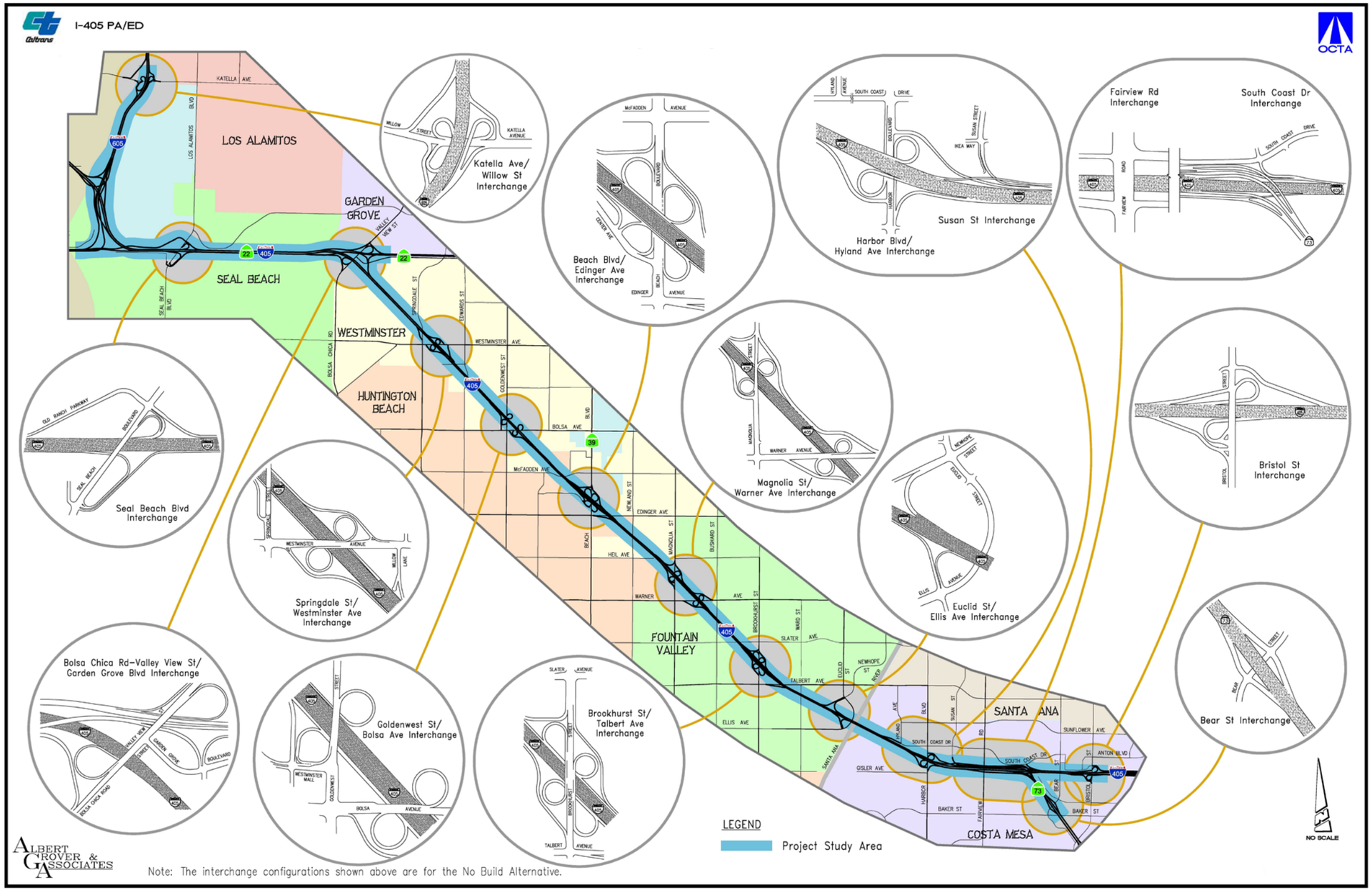

Figure 3.1.6-1: Traffic Study Area within Orange County

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Table 3.1.6-1: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020												Year 2040											
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Adverse Effect	No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Adverse Effect
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
	East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	
Bristol Street	I-405 NB off-ramp/ South Coast Drive	Bristol Street	Sig	0.45	16.4	B	0.73	30.4	C	0.59	19.7	B	0.86	37.1	D	0.59	18.8	B	0.90	38.7	D	N	0.70	24.4	C	0.96	44.2	D	0.71	21.9	C	0.98	46.0	D	N
	I-405 NB On-Ramp (from NB Bristol Street)	Bristol Street	None	0.08	--	--	0.21	--	--	0.10	--	--	0.22	--	--	0.10	--	--	0.22	--	--	--	0.10	--	--	0.23	--	--	0.10	--	--	0.23	--	--	--
	I-405 NB On-Ramp (from SB Bristol Street)	Bristol Street	None	0.20	--	--	0.15	--	--	0.23	--	--	0.16	--	--	0.23	--	--	0.16	--	--	--	0.25	--	--	0.17	--	--	0.25	--	--	0.17	--	--	--
	I-405 SB ramps	Bristol Street	Sig	0.61	15.8	B	0.80	14.8	B	0.63	16.6	B	0.95	19.2	B	0.63	15.5	B	0.96	19.3	B	N	0.68	16.3	B	**1.03**	**27.6**	**F***	0.67	17.2	B	**1.05**	**32.0**	**F***	N
Fairview Road and South Coast Drive	I-405 NB ramps	Fairview Road	Sig	0.93	28.4	C	0.93	24.1	C	**1.06**	**44.0**	**F***	**1.02**	**35.1**	**F***	**1.07**	**44.5**	**F***	**1.02**	**32.9**	**F***	N	**1.14**	**55.5**	**F***	**1.06**	**41.8**	**F***	**1.15**	**56.6**	**F***	**1.08**	**45.8**	**F***	N
	I-405 SB ramps	Fairview Road	Sig	0.79	16.0	B	0.72	17.6	B	0.91	20.5	C	0.76	19.7	B	0.92	20.1	C	0.77	18.5	B	N	0.97	24.8	C	0.79	19.7	B	0.99	25.7	C	0.81	20.1	C	N
	South Coast Drive	I-405 NB off-ramp	Sig	0.19	21.0	C	0.35	24.9	C	0.23	21.6	C	0.39	26.3	C	0.24	21.8	C	0.40	27.1	C	N	0.25	22.0	C	0.41	28.3	C	0.27	22.4	C	0.43	30.8	C	N
Harbor Boulevard and Hyland Avenue	I-405 NB on-ramp/ South Coast Drive	Hyland Avenue	Sig	0.26	8.7	A	0.58	8.0	A	0.42	7.8	A	0.64	9.3	A	0.42	7.8	A	0.64	9.3	A	N	0.57	9.5	A	0.72	12.0	B	0.52	7.9	A	0.67	10.1	B	N
	I-405 SB On-Ramp (from SB Harbor Boulevard)	Harbor Boulevard	None	0.60	--	--	0.65	--	--	0.65	--	--	0.69	--	--	0.65	--	--	0.69	--	--	--	0.67	--	--	0.72	--	--	0.67	--	--	0.72	--	--	--
	I-405 NB off-ramp	Harbor Boulevard	Sig	0.55	19.7	B	0.75	28.3	C	0.61	20.3	C	0.78	28.6	C	0.61	19.5	B	0.78	28.5	C	N	0.63	20.6	C	0.81	29.4	C	0.65	20.2	C	0.81	29.4	C	N
	I-405 NB On-Ramp (from NB Harbor Boulevard)	Harbor Boulevard	None	0.31	--	--	0.38	--	--	0.33	--	--	0.40	--	--	0.33	--	--	0.40	--	--	--	0.35	--	--	0.42	--	--	0.35	--	--	0.42	--	--	--
	I-405 SB off-ramp	Harbor Boulevard	Sig	0.58	18.3	B	0.71	18.1	B	0.63	18.6	B	0.77	19.5	B	0.63	18.4	B	0.77	19.4	B	N	0.65	18.9	B	0.81	20.9	C	0.67	18.9	B	0.80	20.8	C	N
	I-405 SB On-Ramp (from NB Harbor Boulevard)	Harbor Boulevard	None	0.42	--	--	0.23	--	--	0.45	--	--	0.25	--	--	0.45	--	--	0.25	--	--	--	0.46	--	--	0.26	--	--	0.46	--	--	0.26	--	--	--
	Gisler Avenue	Harbor Boulevard	Sig	0.71	26.8	C	0.87	31.8	C	0.77	30.4	C	0.90	33.6	C	0.80	30.6	C	0.89	33.1	C	N	0.80	32.2	C	0.97	40.3	D	0.82	32.8	C	0.96	39.3	D	N
	Ikea Way	Susan Street/ I-405 NB off-ramp	Sig	0.26	2.9	A	0.33	8.0	A	0.31	6.2	A	0.36	8.5	A	0.32	6.4	A	0.36	8.4	A	N	0.35	7.7	A	0.38	8.8	A	0.35	8.0	A	0.37	8.6	A	N
Euclid Street and Ellis Avenue	I-405 NB ramps/ Newhope Street	Euclid Street	Sig	0.48	33.0	C	0.64	37.8	D	0.59	31.3	C	0.82	43.7	D	0.56	30.7	C	0.83	43.9	D	N	0.66	34.2	C	0.91	50.9	D	0.65	31.1	C	0.94	52.1	D	N
	Ellis Avenue/Euclid Street	I-405 SB ramps	Sig	0.94	46.3	D	0.98	51.2	D	**1.14**	**82.2**	**F**	**1.30**	**141.7**	**F**	**1.14**	**80.7**	**F**	**1.31**	**128.0**	**F**	N	**1.37**	**158.7**	**F**	**1.51**	**186.3**	**F**	**1.37**	**155.7**	**F**	**1.52**	**195.6**	**F**	N
Brookhurst Street and Talbert Avenue	Slater Avenue	Brookhurst Street	Sig	0.93	46.5	D	0.81	38.3	D	**1.03**	**57.4**	**F***	**0.91**	**47.0**	**D**	**1.01**	**60.3**	**F***	0.92	44.9	D	N	**1.05**	**67.8**	**F***	**0.97**	**57.6**	**E**	**1.17**	**78.8**	**F***	**1.01**	**64.5**	**F***	Y
	I-405 NB On-Ramp (from SB Brookhurst Street)	Brookhurst Street	None	0.06	--	--	0.08	--	--	0.11	--	--	0.12	--	--	0.11	--	--	0.12	--	--	--	0.14	--	--	0.14	--	--	0.14	--	--	0.14	--	--	--
	I-405 NB Off-Ramp (to NB Brookhurst Street)	Brookhurst Street	None	0.32	--	--	0.41	--	--	0.39	--	--	0.62	--	--	0.39	--	--	0.62	--	--	--	0.43	--	--	0.76	--	--	0.43	--	--	0.76	--	--	--
	I-405 NB Off-Ramp (to SB Brookhurst Street)	Brookhurst Street	None	0.36	--	--	0.29	--	--	0.42	--	--	0.31	--	--	0.42	--	--	0.31	--	--	--	0.45	--	--	0.32	--	--	0.45	--	--	0.32	--	--	--
	I-405 NB On-Ramp (from NB Brookhurst Street)	Brookhurst Street	None	0.42	--	--	0.43	--	--	0.52	--	--	0.57	--	--	0.52	--	--	0.57	--	--	--	0.58	--	--	0.67	--	--	0.58	--	--	0.67	--	--	--
	I-405 SB On-Ramp (from SB Brookhurst Street)	Brookhurst Street	None	0.83	--	--	0.45	--	--	0.88	--	--	0.48	--	--	0.88	--	--	0.48	--	--	--	0.92	--	--	0.50	--	--	0.92	--	--	0.50	--	--	--
	I-405 SB Off-Ramp (to NB Brookhurst Street)	Brookhurst Street	None	0.06	--	--	0.13	--	--	0.06	--	--	0.14	--	--	0.06	--	--	0.14	--	--	--	0.07	--	--	0.14	--	--	0.07	--	--	0.14	--	--	--
	I-405 SB Off-Ramp (to SB Brookhurst Street)	Brookhurst Street	None	0.45	--	--	0.45	--	--	0.48	--	--	0.50	--	--	0.48	--	--	0.50	--	--	--	0.50	--	--	0.53	--	--	0.50	--	--	0.53	--	--	--
	Talbert Avenue	Brookhurst Street	Sig	0.95	47.3	D	0.90	47.8	D	**1.24**	**92.8**	**F**	**0.99**	**58.2**	**E**	**1.24**	**92.7**	**F**	**1.01**	**62.2**	**F***	N	**1.40**	**123.5**	**F**	**1.05**	**70.7**	**F***	**1.42**	**128.7**	**F**	**1.12**	**85.3**	**F**	Y
	Talbert Avenue	I-405 SB On-Ramp (from EB Talbert Avenue)	None	0.69	--	--	0.46	--	--	0.74	--	--	0.50	--	--	0.74	--	--	0.50	--	--	--	0.77	--	--	0.52	--	--	0.77	--	--	0.52	--	--	--

Table 3.1.6-1: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020													Year 2040												
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Adverse Effect	No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Adverse Effect
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	
Magnolia Street and Warner Avenue	Heil Avenue	Magnolia Street	Sig	0.75	22.3	C	0.51	16.1	B	0.82	25.2	C	0.63	18.5	B	0.83	25.5	C	0.65	18.9	B	N	0.87	28.7	C	0.71	20.3	C	0.89	32.1	C	0.78	22.4	C	N
	I-405 NB On-Ramp (from SB Magnolia Street)	Magnolia Street	None	0.07	--	--	0.05	--	--	0.09	--	--	0.05	--	--	0.09	--	--	0.05	--	--	--	0.09	--	--	0.05	--	--	0.09	--	--	0.05	--	--	--
	I-405 NB Off-Ramp (to NB Magnolia Street)	Magnolia Street	None	0.13	--	--	0.34	--	--	0.16	--	--	0.45	--	--	0.16	--	--	0.45	--	--	--	0.17	--	--	0.52	--	--	0.17	--	--	0.52	--	--	--
	I-405 NB On-Ramp (from NB Magnolia Street)	Magnolia Street	None	0.37	--	--	0.26	--	--	0.40	--	--	0.28	--	--	0.40	--	--	0.28	--	--	--	0.42	--	--	0.30	--	--	0.42	--	--	0.30	--	--	--
	I-405 SB On-Ramp (from SB Magnolia Street)	Magnolia Street	None	0.66	--	--	0.23	--	--	0.71	--	--	0.24	--	--	0.71	--	--	0.24	--	--	--	0.73	--	--	0.25	--	--	0.73	--	--	0.25	--	--	--
	I-405 SB off-ramp (to NB and SB Magnolia Street)	Magnolia Street	Sig	0.88	23.1	C	0.77	18.0	B	0.97	36.7	D	0.83	16.7	B	0.99	38.7	D	0.83	16.4	B	N	**1.02**	**37.8**	**F***	0.88	20.2	C	0.85	11.7	B	0.80	20.7	C	N*
	Warner Avenue	Magnolia Street	Sig	0.91	44.8	D	0.94	47.6	D	0.98	53.1	D	**1.01**	**53.8**	**F***	0.99	53.3	D	**1.02**	**55.4**	**F***	N	**1.00**	**62.6**	**F***	**1.07**	**63.0**	**F***	**1.03**	**62.5**	**F***	**1.12**	**75.4**	**F***	Y
	I-405 SB On-Ramp (from EB Warner Avenue)	Warner Avenue	None	0.45	--	--	0.23	--	--	0.46	--	--	0.24	--	--	0.46	--	--	0.24	--	--	--	0.47	--	--	0.25	--	--	0.47	--	--	0.25	--	--	--
	I-405 SB Off-Ramp (to EB Warner Avenue)	Warner Avenue	None	0.17	--	--	0.36	--	--	0.35	--	--	0.38	--	--	0.35	--	--	0.38	--	--	--	0.46	--	--	0.40	--	--	0.46	--	--	0.40	--	--	--
	I-405 NB Off-Ramp (to WB Warner Avenue)	Warner Avenue	None	0.32	--	--	0.42	--	--	0.34	--	--	0.52	--	--	0.34	--	--	0.52	--	--	--	0.35	--	--	0.59	--	--	0.35	--	--	0.59	--	--	--
	I-405 NB On-Ramp (from WB Warner Avenue)	Warner Avenue	None	0.17	--	--	0.27	--	--	0.18	--	--	0.29	--	--	0.18	--	--	0.29	--	--	--	0.19	--	--	0.50	--	--	0.19	--	--	0.50	--	--	--
Beach Boulevard and Edinger Avenue	McFadden Avenue	Beach Boulevard	Sig	0.94	46.3	D	**0.97**	**60.9**	**E**	**1.03**	**72.5**	**F***	**1.05**	**74.7**	**F***	**1.03**	**68.3**	**F***	**1.06**	**76.8**	**F***	N	**1.11**	**81.8**	**F**	**1.13**	**86.6**	**F**	**1.15**	**94.5**	**F**	**1.14**	**92.3**	**F**	Y
	I-405 NB On-Ramp (from SB Beach Boulevard)	Beach Boulevard	None	0.18	--	--	0.17	--	--	0.19	--	--	0.18	--	--	0.19	--	--	0.18	--	--	--	0.20	--	--	0.19	--	--	0.20	--	--	0.19	--	--	--
	I-405 NB Off-Ramp (to NB Beach Boulevard)	Beach Boulevard	None	0.56	--	--	0.60	--	--	0.58	--	--	0.64	--	--	0.58	--	--	0.64	--	--	--	0.59	--	--	0.67	--	--	0.59	--	--	0.67	--	--	--
	I-405 NB Off-Ramp (to SB Beach Boulevard)	Beach Boulevard	None	0.46	--	--	0.47	--	--	0.49	--	--	0.62	--	--	0.49	--	--	0.62	--	--	--	0.51	--	--	0.72	--	--	0.51	--	--	0.72	--	--	--
	I-405 NB On-Ramp (from NB Beach Boulevard)	Beach Boulevard	None	0.51	--	--	0.61	--	--	0.55	--	--	0.67	--	--	0.55	--	--	0.67	--	--	--	0.58	--	--	0.71	--	--	0.58	--	--	0.71	--	--	--
	Center Avenue	Beach Boulevard	Sig	0.72	18.2	B	0.83	17.6	B	0.82	11.5	B	0.93	27.2	C	0.85	20.3	C	0.97	28.7	C	N	0.92	19.5	B	**1.00**	**37.8**	**F***	0.95	19.8	B	**1.04**	**44.7**	**F***	Y
	Center Avenue (Huntington Beach Mall)	I-405 SB ramps	Sig	0.43	15.3	B	0.77	22.9	C	0.58	16.9	B	0.86	28.1	C	0.58	16.8	B	0.86	28.2	C	N	0.65	17.5	B	0.92	36.4	D	0.66	17.5	B	0.92	36.7	D	N
	I-405 SB Off-Ramp (to NB Beach Boulevard)	Beach Boulevard	None	0.03	--	--	0.10	--	--	0.03	--	--	0.11	--	--	0.03	--	--	0.11	--	--	--	0.03	--	--	0.11	--	--	0.03	--	--	0.11	--	--	--
	Edinger Avenue	Beach Boulevard	Sig	**0.94**	**55.1**	**E**	**0.99**	**59.1**	**E**	**1.06**	**60.6**	**F***	**1.05**	**66.6**	**F***	**1.08**	**62.8**	**F***	**1.08**	**70.8**	**F***	Y	**1.15**	**78.9**	**F***	**1.11**	**79.4**	**F***	**1.21**	**86.8**	**F**	**1.18**	**89.0**	**F**	Y
	Edinger Avenue	I-405 SB On-Ramp	None	0.60	--	--	0.50	--	--	0.67	--	--	0.52	--	--	0.67	--	--	0.52	--	--	--	0.71	--	--	0.54	--	--	0.71	--	--	0.54	--	--	--
Goldenwest Street and Bolsa Avenue	I-405 NB On-Ramp (from NB Goldenwest Street)	Goldenwest Street	None	0.50	--	--	0.53	--	--	0.55	--	--	0.59	--	--	0.55	--	--	0.59	--	--	--	0.58	--	--	0.63	--	--	0.58	--	--	0.63	--	--	--
	Westminster Mall	I-405 SB ramps	Sig	0.31	6.5	A	0.37	8.9	A	0.36	6.9	A	0.40	9.9	A	0.36	7.0	A	0.40	9.7	A	N	0.39	6.8	A	0.42	10.4	B	0.39	7.8	A	0.43	10.4	B	N
	Westminster Mall	Goldenwest Street	Sig	0.65	9.3	A	0.61	10.5	B	0.71	10.5	B	0.69	12.1	B	0.72	10.7	B	0.67	12.0	B	N	0.76	11.7	B	0.75	13.2	B	0.81	13.2	B	0.79	12.8	B	N
	Bolsa Avenue	Goldenwest Street	Sig	0.68	36.0	D	0.95	49.4	D	0.76	36.8	D	**1.00**	**61.8**	**F***	0.75	37.2	D	**0.99**	**60.2**	**E**	N	0.80	38.2	D	**1.04**	**72.0**	**F***	0.84	39.7	D	**1.13**	**85.6**	**F**	Y
	I-405 SB On-Ramp (from EB Bolsa Avenue)	Bolsa Avenue	None	0.22	--	--	0.49	--	--	0.23	--	--	0.51	--	--	0.23	--	--	0.51	--	--	--	0.23	--	--	0.52	--	--	0.12	--	--	0.26	--	--	--
	I-405 SB Off-Ramp (to EB Bolsa Avenue)	Bolsa Avenue	Stop	0.35	10.7	B	0.15	10.3	B	0.38	11.0	B	0.17	10.5	B	0.38	11.0	B	0.17	10.5	B	N	0.40	11.3	B	0.18	10.7	B	0.41	11.7	B	0.18	10.7	B	N
	I-405 NB Off-Ramp (to WB Bolsa Avenue)	Bolsa Avenue	None	0.53	--	--	0.47	--	--	0.58	--	--	0.51	--	--	0.58	--	--	0.51	--	--	--	0.61	--	--	0.54	--	--	0.61	--	--	0.54	--	--	--

Table 3.1.6-1: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020												Year 2040											
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Adverse Effect	No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Adverse Effect
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
	East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	
Springdale Street and Westminster Avenue	I-405 SB off-ramp	Springdale Street	Stop*	0.47	28.1	D	**0.60**	**36.1**	**E**	**0.67**	**47.9**	**E**	**0.69**	**45.9**	**E**	**0.66**	**46.6**	**E**	**0.67**	**42.9**	**E**	N	**0.83**	**76.2**	**F**	**0.85**	**75.8**	**F**	**0.85**	**80.9**	**F**	**0.85**	**76.3**	**F**	N
	Westminster Avenue	Springdale Street	Sig	0.76	39.9	D	0.79	40.1	D	0.83	42.0	D	0.89	44.9	D	0.82	41.5	D	0.89	46.0	D	N	0.84	44.1	D	**0.98**	**60.7**	**E**	0.89	46.3	D	**0.97**	**57.2**	**E**	N
	I-405 SB On-Ramp	Westminster Avenue	None	0.24	--	--	0.30	--	--	026	--	--	0.32	--	--	026	--	--	0.32	--	--	--	0.27	--	--	0.34	--	--	0.27	--	--	0.34	--	--	--
	I-405 SB Off-Ramp (to EB Westminster Avenue)	Westminster Avenue	None	0.16	--	--	0.15	--	--	0.18	--	--	0.16	--	--	0.18	--	--	0.16	--	--	--	0.19	--	--	0.16	--	--	0.19	--	--	0.16	--	--	--
	I-405 NB Off-Ramp (to WB Westminster Avenue)	Westminster Avenue	None	0.40	--	--	0.38	--	--	0.43	--	--	0.43	--	--	0.43	--	--	0.43	--	--	--	0.44	--	--	0.47	--	--	0.44	--	--	0.47	--	--	--
	I-405 NB On-Ramp	Westminster Avenue	None	0.30	--	--	0.28	--	--	0.32	--	--	0.30	--	--	0.32	--	--	0.30	--	--	--	0.34	--	--	0.32	--	--	0.34	--	--	0.32	--	--	--
	Westminster Avenue	Willow Lane	Sig	0.50	14.1	B	0.53	12.6	B	0.58	14.6	B	0.65	14.7	B	0.61	14.7	B	0.65	14.1	B	N	0.61	15.4	B	0.72	19.2	B	0.69	17.7	B	0.78	20.6	C	N
Bolsa Chica Road/ Valley View Street/ Garden Grove Boulevard	Garden Grove Boulevard	I-405 NB off-ramp/ SR-22 EB ramps	Sig	0.84	47.3	D	0.93	54.7	D	**0.89**	**55.8**	**E**	**0.99**	**67.6**	**E**	**0.90**	**56.1**	**E**	**0.99**	**62.3**	**E**	N	**0.94**	**60.4**	**E**	**1.03**	**75.8**	**F***	0.91	48.7	D	0.94	47.6	D	N*
	Garden Grove Boulevard	Bolsa Chica Road/ Valley View Street	Sig	0.92	23.7	C	**1.06**	**40.7**	**F***	0.91	23.3	C	**1.00**	**39.1**	**F***	0.92	24.5	C	**1.03**	**40.1**	**F***	Y	0.99	32.2	C	**1.06**	**57.0**	**F***	0.99	32.4	C	**1.10**	**65.8**	**F***	Y
	I-405 SB On-Ramp (from SB Bolsa Chica Road)	Bolsa Chica Road	None	0.49	--	--	0.61	--	--	0.63	--	--	0.76	--	--	0.63	--	--	0.76	--	--	--	0.72	--	--	0.86	--	--	0.72	--	--	0.86	--	--	--
	I-405 SB Off-Ramp (to SB Bolsa Chica Road)	Bolsa Chica Road	None	0.55	--	--	0.45	--	--	0.78	--	--	0.65	--	--	0.78	--	--	0.65	--	--	--	0.93	--	--	0.78	--	--	0.93	--	--	0.78	--	--	--
Seal Beach Boulevard	I-405 NB ramps/ Old Ranch Parkway	Seal Beach Boulevard	Sig	0.88	36.0	D	0.92	38.7	D	0.74	27.6	C	0.88	33.3	C	0.74	27.5	C	0.93	34.7	C	N	0.82	31.6	C	0.93	40.8	D	0.90	46.5	D	**0.94**	**58.8**	**E**	N
	I-405 SB ramps/ Beverly Manor Road	Seal Beach Boulevard	Sig	0.95	46.4	D	**1.01**	**55.2**	**F***	**1.04**	**57.1**	**F***	**1.12**	**63.1**	**F***	**1.04**	**55.9**	**F***	**1.12**	**62.6**	**F***	N	**1.10**	**66.5**	**F***	**1.21**	**81.0**	**F**	1.13	67.5	F*	**1.29**	**96.7**	**F***	N
	Old Ranch Pkwy	SR-22 WB On-Ramp	None	0.30	--	--	0.22	--	--	0.32	--	--	0.24	--	--	0.32	--	--	0.24	--	--	--	0.34	--	--	0.25	--	--	0.34	--	--	0.25	--	--	N
Bear Street at SR-73	SR-73 NB ramps	Bear Street	Sig	0.50	13.6	B	0.47	12.8	B	0.55	14.1	B	0.53	13.3	B	0.55	16.1	B	0.52	15.0	B	N	0.59	14.7	B	0.56	13.8	B	0.59	14.5	B	0.56	13.8	B	N
	SR-73 SB ramps	Bear Street	Sig	0.43	13.1	B	0.51	13.5	B	0.48	13.3	B	0.55	14.3	B	0.49	14.4	B	0.58	16.1	B	N	0.52	13.6	B	0.63	15.9	B	0.53	13.7	B	0.67	16.7	B	N
Katella Avenue/ Willow Street at I-605	Katella Avenue	I-605 NB on-ramp	Sig	0.64	1.7	A	0.65	3.7	A	0.69	2.5	A	0.73	5.1	A	0.69	2.6	A	0.73	5.0	A	--	0.75	3.2	A	0.80	6.6	A	0.75	3.2	A	0.79	6.4	A	N
	Katella Avenue	I-605 NB Off-Ramp (to EB Katella Avenue)	None	0.76	--	--	0.49	--	--	0.81	--	--	0.52	--	--	0.81	--	--	0.52	--	--	--	0.84	--	--	0.55	--	--	0.84	--	--	0.55	--	--	--
	Katella Avenue	I-605 NB Off-Ramp (to WB Katella Avenue)	None	0.03	--	--	0.05	--	--	0.05	--	--	0.07	--	--	0.05	--	--	0.07	--	--	--	0.06	--	--	0.08	--	--	0.06	--	--	0.08	--	--	--
	Katella Avenue	I-605 SB On-Ramp (from WB Katella Avenue)	None	0.36	--	--	0.44	--	--	0.38	--	--	0.47	--	--	0.38	--	--	0.47	--	--	--	0.40	--	--	0.49	--	--	0.40	--	--	0.49	--	--	--
	Katella Avenue	I-605 SB Off-Ramp (to EB Katella Avenue)	None	0.80	--	--	0.72	--	--	0.86	--	--	0.76	--	--	0.86	--	--	0.76	--	--	--	0.89	--	--	0.79	--	--	0.89	--	--	0.79	--	--	--
	Katella Avenue	I-605 SB On-Ramp (from EB Katella Avenue)	None	0.04	--	--	0.03	--	--	0.11	--	--	0.08	--	--	0.11	--	--	0.08	--	--	--	0.15	--	--	0.11	--	--	0.15	--	--	0.11	--	--	--
	Willow Street	I-605 SB Off-Ramp (to WB Willow Street)	None	0.36	--	--	0.36	--	--	0.39	--	--	0.42	--	--	0.39	--	--	0.42	--	--	--	0.41	--	--	0.46	--	--	0.41	--	--	0.46	--	--	--

Notes:
1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio
2. F* = Due to excessive v/c ratio (over 1.0), the intersection is expected to operate at LOS F.
3. * = LOS is based on the stop-controlled off-ramp movement (left turn or right turn) with the highest delay.
4. Rows are bold when an intersection is forecast to operate at LOS E or F under no-build or project conditions.
5. Shaded cells indicate an adverse effect.
6. -- = LOS and average delay are not calculated from intersections without traffic control. The adverse effect determination applies only to controlled intersections.
7. "Build" refers to all three build alternatives, Alternatives 1, 2, and 3. There is very small variation among the forecast peak hour traffic volumes at the freeway interchanges. The highest of the three alternative forecasts was used for the Build condition, representing a worst-case condition.

Source: Albert Grover & Associates 2011.

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Existing (Year 2009) Lane Configuration

Existing (year 2009) lane schematics for the I-405 mainline and all interchange ramps within the traffic study area in Orange County are illustrated in Figure 3.1.6-2.

I-405 Mainline. Within the study area in Orange County, I-405 is a controlled-access freeway generally oriented in a northwest-southeast direction. There is one HOV lane in each direction; a second HOV lane in each direction is currently under construction from SR-22 East to I-605. The HOV lanes are generally separated from the GP lanes via a striped buffer (1 to 4 ft wide).

The number of GP lanes varies by segment:

From SR-73 to Brookhurst Street, there are five to seven GP lanes in each direction, with seven at SR-73 and five at Brookhurst Street;

From Brookhurst Street to SR-22 East, there are four GP lanes in each direction;

From SR-22 East to I-605, there are six GP lanes in each direction east of SR-22 West/ 7th Street and five GP lanes west of SR-22 West/7th Street to I-605.

Figures 3.1.6-3 and 3.1.6-4 schematically show the number of mainline lanes on I-405 between SR-73 and I-605 in the northbound and southbound directions, respectively.

The existing lane width varies between 11 ft and 12 ft. The outside shoulder generally has the standard width of 10 ft, while the inside shoulder is only 2 to 3 ft wide through a large portion of the corridor. There is no pedestrian or bicycle access to I-405.

Bristol Street Interchange. The I-405/Bristol Street interchange is a partial-cloverleaf interchange, and the Bristol Street/ I-405 northbound off-ramp/South Coast Plaza and Bristol Street/I-405 southbound ramps intersections are signalized. All other ramp/arterial intersections are not signalized and provide continuous right turns. Between the two signalized ramp intersections, Bristol Street is an eight-lane roadway.

Fairview Road Interchange (includes South Coast Drive). The I-405/Fairview Road interchange is a diamond interchange, and both ramp intersections are signalized. The I-405 northbound off-ramp at South Coast Drive (South Coast Drive off-ramp) is located south of the Fairview Road interchange and is also a signalized intersection. Between the two ramp intersections on Fairview Road, Fairview Road is a 10-lane roadway, including turning lanes.

Harbor Boulevard and Hyland Avenue Interchange (includes Susan Street). The I-405/Harbor Boulevard interchange is a partial-cloverleaf interchange with one tangent (relatively straight and without a loop) ramp located on Hyland Avenue. The intersections of Hyland Avenue/I-405

northbound on-ramp/South Coast Drive, Harbor Boulevard/I-405 northbound off-ramp, and Harbor Boulevard/I-405 southbound off-ramp are signalized intersections. The I-405 northbound off-ramp at Susan Street (Susan Street off-ramp) is located south of the Harbor Boulevard interchange and is also a signalized intersection. All other ramp/arterial intersections are not signalized and provide continuous right turns. Between the two ramp intersections with Harbor Boulevard, Harbor Boulevard is an eight-lane roadway.

Euclid Street and Ellis Avenue Interchange. The I-405/Euclid Street interchange is a two-quadrant cloverleaf. The I-405 northbound ramps at Euclid Street/Newhope Street is an eight-phase signalized intersection. The I-405 southbound ramps at the Euclid Street/Ellis Avenue intersection are currently signalized and also serve as an access to the OCSD facility located south of Ellis Avenue in Fountain Valley. Between the two ramp intersections, Euclid Street/ Ellis Avenue is a five- to six-lane roadway.

Brookhurst Street and Talbert Avenue Interchange. The I-405/Brookhurst Street interchange is a full-cloverleaf interchange with one tangent ramp located on Talbert Avenue. None of the ramp intersections are signalized. The two City-controlled study intersections of Brookhurst Street/ Slater Avenue and Brookhurst Street/Talbert Avenue are signalized. Between Talbert Avenue/ Slater Avenue, Brookhurst Street has six through lanes.

Magnolia Street and Warner Avenue Interchange. The I-405/Magnolia Street interchange is currently a modified full-cloverleaf interchange with ramps located on Magnolia Street and Warner Avenue. Only the I-405 southbound off-ramp at Magnolia Street is signalized. All other ramp/arterial intersections are not signalized and provide continuous right turns. The two City-controlled study intersections of Magnolia Street/Heil Avenue and Magnolia Street/Warner Avenue are signalized. In between the two ramp intersections with Magnolia Street, Magnolia Street is a four-lane roadway. Warner Avenue has six through lanes in the interchange.

Beach Boulevard and Edinger Avenue Interchange. The I-405/Beach Boulevard interchange is a full-cloverleaf interchange with one tangent ramp located on Edinger Avenue and the southbound on-/off-ramps for southbound Beach Boulevard located on Center Avenue. The intersections of I-405 southbound ramps/Center Avenue and Beach Boulevard/Center Avenue are signalized. All other ramp/arterial intersections are not signalized and provide continuous right turns. While Beach Boulevard is an eight-lane facility approaching the I-405 interchange, it provides three through lanes and an auxiliary lane in each direction within the body of the interchange.

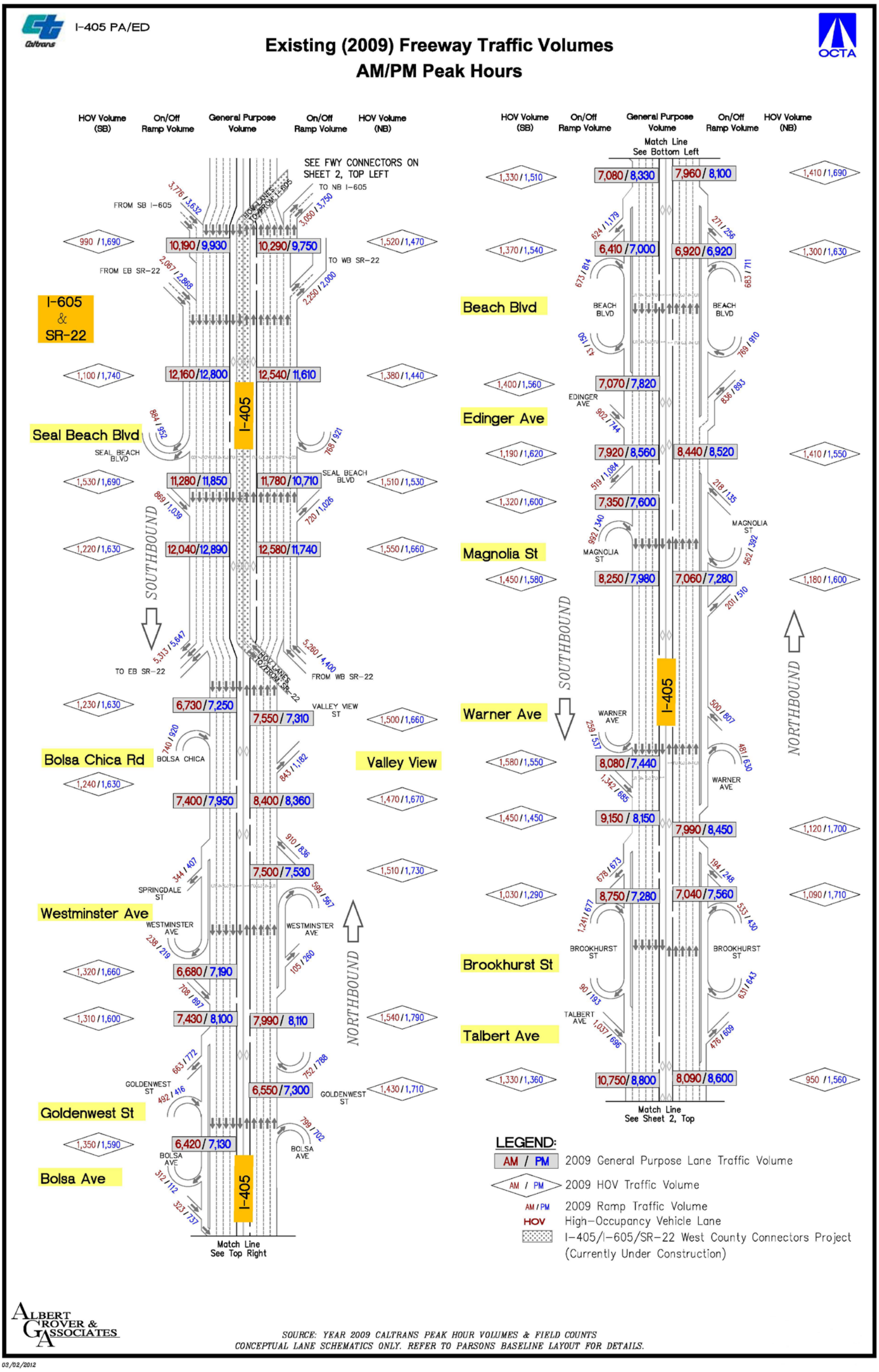

Figure 3.1.6-2: Existing (2009) Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 1 of 2)

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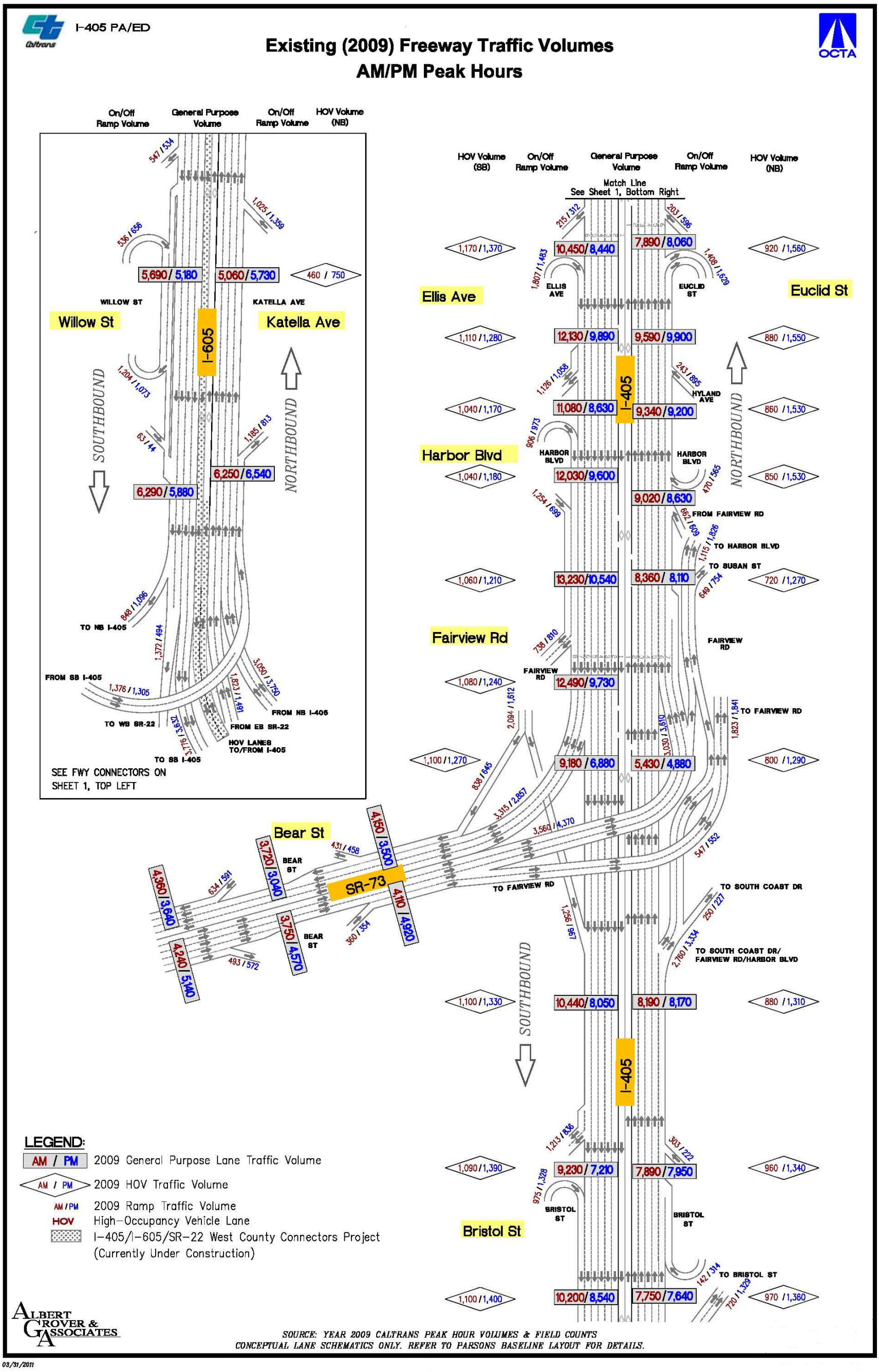

Figure 3.1.6-2: Existing (2009) Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 2 of 2)

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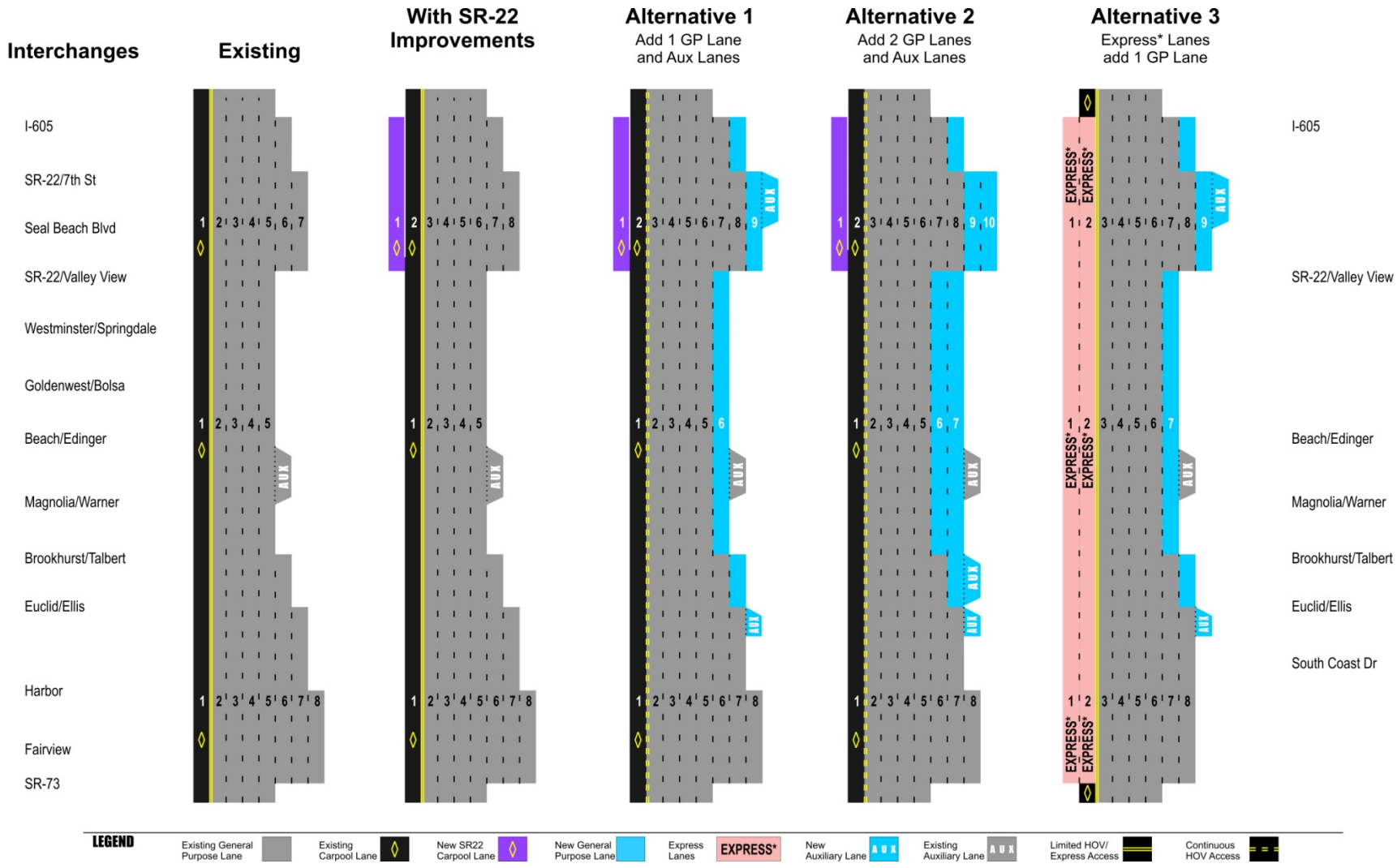

Figure 3.1.6-3: I-405 Northbound Lane Schematic

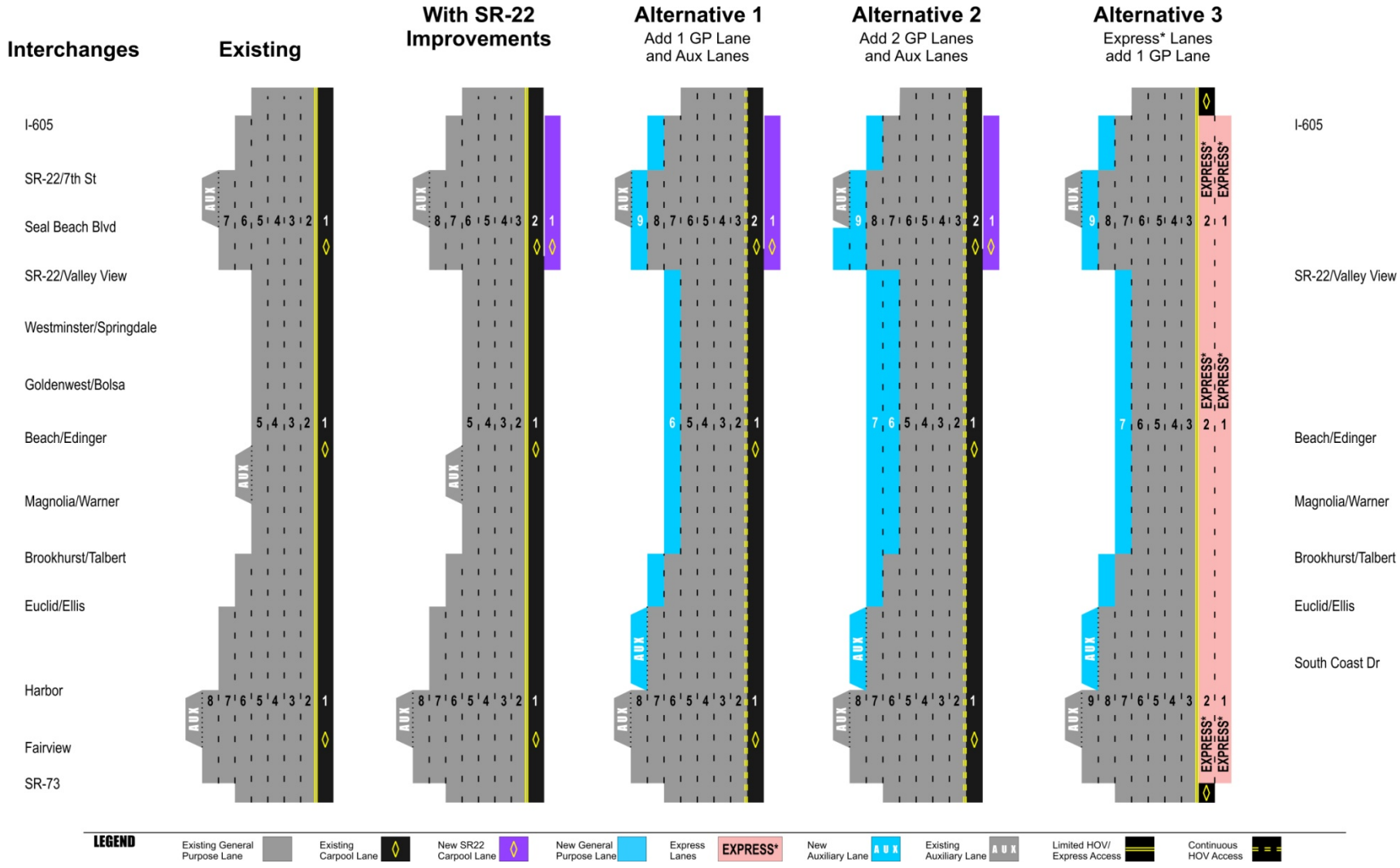

Figure 3.1.6-4: I-405 Southbound Lane Schematic

Goldenwest Street and Bolsa Avenue Interchange. The I-405 interchange at Goldenwest Street and Bolsa Avenue provides movements in both directions along I-405 and both directions of the two arterials, except that there is no provision for movements from Goldenwest Street southbound to northbound I-405, from Bolsa Avenue westbound to southbound I-405, and from I-405 northbound to Bolsa Avenue eastbound. Under existing conditions, the intersections of Goldenwest Street/Bolsa Avenue, Goldenwest Street/ Westminster Mall Road, and I-405 southbound ramps/Westminster Mall Road are signalized. All other study intersections are not signalized and are continuous right-turn lanes, with the exception of the I-405 southbound (loop) off-ramp at eastbound Bolsa Avenue, which is stop controlled. Within the interchange, northbound Goldenwest Street has three through lanes; southbound it narrows from three lanes to two lanes as it approaches the interchange and widens back to three through lanes south of Westminster Mall Road. Within the interchange, eastbound Bolsa Avenue has two through lanes; westbound it approaches the interchange with two lanes widening to three lanes where the loop ramp from northbound I-405 adds a westbound lane that is maintained continuously to the west.

Springdale Street and Westminster Avenue Interchange. The I-405/Westminster Avenue interchange is a partial-cloverleaf interchange with one tangent ramp located on Springdale Street. Under existing conditions, only the City-controlled intersections of Westminster Avenue/Springdale Street and Westminster Avenue/Willow Lane are signalized. All ramp arterial intersections are unsignalized, with the Springdale Street/I-405 southbound off-ramp intersection controlled by a stop sign and all others uncontrolled. Within the interchange, Springdale Street/Westminster Avenue both have two through lanes in each direction.

Bolsa Chica Road/Valley View Street and Garden Grove Boulevard Interchange. The I-405 interchange at Bolsa Chica Road, Valley View Street, and Garden Grove Boulevard is a complex interchange overlapping with the SR-22 interchange at Bolsa Chica Road, Valley View Street, and Garden Grove Boulevard. The I-405 interchange accommodates all movements between I-405 and the arterial roadways except for Bolsa Chica Road northbound to southbound I-405. The interchange also accommodates movements from I-405 northbound to eastbound SR-22 and from SR-22 westbound to southbound I-405 via freeway ramps and local arterial streets. Under existing conditions, the intersections of I-405 northbound off-ramp/SR-22 eastbound ramps at Garden Grove Boulevard and Bolsa Chica Road/Valley View Street at Garden Grove Boulevard are signalized. All other study intersections are unsignalized. Garden Grove Boulevard has two through lanes in each direction in the vicinity of the interchange. Northbound Bolsa Chica Road/Valley View Street narrows from three to two through lanes south of the interchange and then widens back to three through lanes at Garden Grove Boulevard; southbound Bolsa Chica Road/Valley View Street drops its #3 through lane into the westbound SR-22/I-405 northbound

entrance ramp, and continues with two through lanes until the eastbound SR-22/I-405 southbound exit ramp adds a third southbound through lane that is maintained continuously to the south.

Seal Beach Boulevard Interchange (includes Old Ranch Parkway at Westbound SR-22). The I-405/Seal Beach Boulevard interchange is a two-quadrant cloverleaf with an additional tangent ramp from Old Ranch Road to westbound SR-22. Under existing conditions, the intersections of I-405 northbound ramps/Seal Beach Boulevard and I-405 southbound ramps/Seal Beach Boulevard are signalized. Seal Beach Boulevard, within the body of the interchange, has two through lanes in each direction; the SR-22 WCC Project, will provide three through lanes in each direction.

Bear Street/SR-73 Interchange. The SR-73/Bear Street interchange is a diamond interchange, and both ramp intersections are signalized. Between the ramp intersections, Bear Street has two through lanes in each direction, plus turning lanes.

Katella Avenue/I-605 Interchange. The I-605/Katella Avenue/Willow Street interchange is a modified partial-cloverleaf interchange, and the Katella Avenue/I-605 northbound on-ramp is the only signalized intersection. All other ramp/arterial intersections are not signalized and provide continuous right turns. Within the body of the interchange, Katella Avenue/Willow Street has two through lanes in each direction.

Existing (Year 2009) Traffic Conditions

Existing traffic data for the traffic study area within Orange County are for the year 2009. Traffic data and the results of operational analysis are presented below for Existing 2009 for both the freeway mainline and the interchange areas.

Freeway Mainline

Existing (year 2009) traffic volumes for the mainline freeway were obtained from Caltrans Performance Monitoring System (PeMS) data and Caltrans-published traffic volumes data available on the Caltrans Web site. Existing (year 2009) AM and PM peak-hour traffic volumes for the I-405 mainline and all interchange ramps within the project limits are illustrated in Figure 3.1.6-2.

The existing (year 2009) average daily traffic (ADT) along the I-405 mainline freeway ranges from **257,000 vehicles per day (vpd) to 370,000 vpd**. Existing ADT volumes in the three study segments are included in Table 3.1.6-2. Existing daily vehicle miles of travel (VMT) in the study corridor is **4,063,000**, as shown in Table 3.1.6-3.

V/C Ratio and LOS. Table 3.1.6-4 presents the LOS and v/c ratios for peak hours of the existing year (2009) in the GP lanes of the northbound and southbound freeway. Under existing conditions, the freeway mainline operates at LOS F in the AM peak hour in the southbound direction and LOS D to F in the northbound direction. In the PM peak hour, the freeway mainline LOS is F in the northbound direction and D to F in the southbound direction. The range of v/c ratios in the freeway's GP lanes during the AM peak hour is **0.89 to 1.24** and **0.93 to 1.16** during the PM peak hour. A more-detailed link-by-link presentation of the existing freeway mainline LOS under 2009 traffic conditions for GP and HOV lanes is included in Appendix L1 (Table O-2). The LOS and v/c data reported in Table 3.1.6-4 is for the worst-case interchange-to-interchange link within each study segment.

Table 3.1.6-5 presents the LOS and v/c ratios for peak hours of the existing year (2009) in the HOV (carpool) lanes. The HOV lanes operate at LOS B to D in the northbound direction and LOS D in the southbound direction during the AM peak hour; they operate at LOS F in the northbound direction and LOS D to F in the southbound direction during the PM peak hour. A more-detailed link-by-link presentation of the existing freeway mainline LOS under 2009 traffic conditions for GP and HOV lanes is included in Appendix L1 (Table O-2). The range of v/c ratios in the HOV lanes during the AM peak hour is **0.58 to 0.94** and **0.82 to 1.08** during the PM peak hour.

Peak-Period Performance. Table 3.1.6-6 shows existing speeds along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Table 3.1.6-6 also shows the average speed across both lane types. Existing speeds in the GP lanes during peak hours range from **22 to 54 mph**. Existing speeds in the HOV lanes during peak hours range from **43 to 62 mph**. For both lane types combined, average speeds weighted for the volumes using each lane type range from **28 to 56 mph**.

Corridor Travel Time. Table 3.1.6-7 shows existing corridor travel time along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Table 3.1.6-7 also shows the average travel time across both lane types. Existing travel time in the GP lanes during peak hours ranges from **15 to 37 minutes**. Existing travel time in the HOV lanes during peak hours ranges from **13 to 19 minutes**. For both lane types combined, average travel time weighted for th e volumes using each lane type ranges from **15 to 30 minutes**.

Table 3.1.6-2: I-405 Mainline Average Daily Traffic in the Area of Proposed Improvements

Segment	2009	2020				2040			
		No Build	Alt 1	Alt 2	Alt 3	No Build	Alt 1	Alt 2	Alt 3
SR-73 to Brookhurst Street	307,000	373,000	373,600	374,200	380,200	417,000	418,000	419,000	429,000
Brookhurst Street to SR-22 East	257,000	297,200	303,200	309,200	311,600	324,000	334,000	344,000	348,000
SR-22 East to I-605	370,000	441,400	447,400	453,400	449,800	489,000	499,000	509,000	503,000

Source: Albert Grover & Associates 2011.

Table 3.1.6-3: I-405 Mainline Estimated Daily Vehicle Miles of Travel in the Area of Proposed Improvements

Segment	2009	2020				2040			
		No Build	Alt 1	Alt 2	Alt 3	No Build	Alt 1	Alt 2	Alt 3
SR-73 to Brookhurst Street	1,053,000	1,279,000	1,281,000	1,284,000	1,304,000	1,430,000	1,434,000	1,437,000	1,471,000
Brookhurst Street to SR-22 East	1,796,000	2,077,000	2,119,000	2,161,000	2,178,000	2,265,000	2,335,000	2,405,000	2,433,000
SR-22 East to I-605	1,214,000	1,448,000	1,467,000	1,487,000	1,475,000	1,604,000	1,637,000	1,670,000	1,650,000
TOTAL	4,063,000	4,804,000	4,867,000	4,932,000	4,957,000	5,299,000	5,406,000	5,512,000	5,554,000

Source: Albert Grover & Associates 2011.

Table 3.1.6-4: I-405 Mainline GP Lane Density, LOS, and Volume-to-Capacity Ratio for Year 2020 – Locations in Orange County

Segment	NB or SB	Existing 2009						No Build – 2020						Alternative 1 – 2020						Alternative 2 – 2020						Alternative 3 - 2020					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C
SR-73 to Brookhurst Street	NB	27.1	D	0.89	*	F	0.93	38.4	F	1.14	*	F	1.29	34.4	F	1.07	*	F	1.21	34.4	F	1.07	*	F	1.21	30.2	D	0.99	37.8	F	1.13
	SB	43.9	F	1.16	29.6	D	0.95	*	F	1.48	42.2	F	1.18	*	F	1.40	38.3	F	1.13	*	F	1.40	38.3	F	1.13	*	F	1.34	33.7	F	1.06
Brookhurst Street to SR-22 East	NB	*	F	1.14	42.9	F	1.15	*	F	1.42	*	F	1.53	42.6	F	1.19	*	F	1.27	31.4	F	1.02	35.3	F	1.09	37.4	F	1.12	43.6	F	1.20
	SB	*	F	1.24	42	F	1.16	*	F	1.61	*	F	1.43	*	F	1.34	43	F	1.19	39.2	F	1.15	31.6	F	1.02	*	F	1.26	36.7	F	1.11
SR-22 East to I-605	NB	*	F	1.13	*	F	1.06	*	F	1.31	*	F	1.30	39	F	1.14	38.7	F	1.14	31.9	F	1.03	31.7	F	1.03	42.7	F	1.19	42.2	F	1.18
	SB	*	F	1.10	*	F	1.16	*	F	1.31	*	F	1.30	39.4	F	1.15	38.3	F	1.13	39.4	F	1.15	38.3	F	1.13	43.4	F	1.20	41.6	F	1.18

NB – Northbound; SB – Southbound; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; * - Density not calculated under HCM because volume exceeds the range of the density algorithm; Shaded cells have lower V/C in 2020 than in 2009.

Source: Albert Grover & Associates 2011.

Table 3.1.6-5: I-405 Mainline HOV/Express Lane LOS and Volume-to-Capacity Ratio for Year 2020 – Locations in Orange County

Segment	NB or SB	Existing 2009 HOV Lanes						No Build HOV Lanes – 2020						Alternative 1 HOV Lanes – 2020						Alternative 2 HOV Lanes - 2020						Alternative 3 Express Lanes - 2020					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C
SR-73 to Brookhurst Street	NB	15.6	B	0.58	46.4	F	0.93	38.4	F	1.14	*	F	1.29	34.4	F	1.07	*	F	1.21	34.4	F	1.07	*	F	1.21	22.3	C	0.78	24.6	C	0.86
	SB	27.8	D	0.81	27.8	D	0.82	42.2	F	1.48	42.2	F	1.18	*	F	1.40	38.3	F	1.13	38.3	F	1.40	38.3	F	1.13	24.6	C	0.86	22.3	C	0.78
Brookhurst Street to SR-22 East	NB	28.2	D	0.85	30.9	F	1.08	*	F	1.42	*	F	1.53	42.6	F	1.19	*	F	1.27	31.4	F	1.02	35.3	F	1.09	22.3	C	0.78	24.6	C	0.86
	SB	25.4	D	0.88	36	E	0.99	*	F	1.61	*	F	1.43	*	F	1.34	43	F	1.19	29.4	F	1.15	31.6	F	1.02	24.6	C	0.86	22.7	C	0.80
SR-22 East to I-605	NB	27.7	D	0.94	32.5	F	1.01	*	F	1.29	*	F	1.16	39	F	1.07	38.7	F	1.07	31.9	D	0.96	31.7	D	0.96	26.2	D	0.92	26.2	D	0.92
	SB	52.7	D	0.67	52.7	F	1.05	*	F	1.17	44.4	F	1.20	38.3	F	1.08	38.3	F	1.07	38.3	F	1.08	38.3	F	1.07	26.2	D	0.92	26.2	D	0.92

NB – Northbound; SB – Southbound; HOV – High-Occupancy Vehicle; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; * - Density not calculated under HCM because volume exceeds the range of the density algorithm; Shaded cells have lower V/C in 2020 than in 2009.

Source: Albert Grover & Associates 2011.

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Table 3.1.6-6: Speed Index Summary – Year 2040 in the Area of Proposed Improvements

Period	Condition	Lane Type			
		GP	HOV	Express	Average
Northbound I-405					
AM	Existing 2009	46	62	--	50
	No Build – 2040	7	8	--	7
	Alternative 1 – 2040	22	24	--	22
	Alternative 2 – 2040	40	43	--	40
	Alternative 3– 2040	35	--	65	41
PM	Existing 2009	33	43	--	35
	No Build – 2040	6	7	--	6
	Alternative 1 – 2040	15	15	--	15
	Alternative 2 – 2040	29	31	--	29
	Alternative 3 – 2040	29	--	65	36
Southbound I-405					
AM	Existing 2009	22	50	--	28
	No Build – 2040	5	6	--	5
	Alternative 1 – 2040	9	10	--	9
	Alternative 2 – 2040	16	17	--	16
	Alternative 3 – 2040	18	--	65	28
PM	Existing 2009	54	62	--	56
	No Build – 2040	8	9	--	8
	Alternative 1 – 2040	25	27	--	25
	Alternative 2 – 2040	42	44	--	42
	Alternative 3 – 2040	38	--	65	44
-- Lane type does not exist in the alternative.					

Source: Albert Grover & Associates 2011.

Table 3.1.6-7: Corridor Travel Time in the Area of Proposed Improvements

Period	Condition	SR-73 to I-605 Travel Time in Minutes			
		GP	HOV	Express	Average
Northbound I-405					
AM	Existing 2009	18	13	--	17
	No Build – 2040	114	101	--	111
	Alternative 1 – 2040	37	34	--	36
	Alternative 2 – 2040	21	19	--	20
	Alternative 3 – 2040	23	--	13	20
PM	Existing 2009	25	19	--	24
	No Build – 2040	133	121	--	130
	Alternative 1 – 2040	57	54	--	56
	Alternative 2 – 2040	28	27	--	28
	Alternative 3 – 2040	29	--	13	23
Southbound I-405					
AM	Existing 2009	37	17	--	30
	No Build – 2040	163	147	--	160
	Alternative 1 – 2040	89	85	--	88
	Alternative 2 – 2040	52	50	--	51
	Alternative 3 – 2040	45	--	13	30
PM	Existing 2009 – 2040	15	13	--	15
	No Build – 2040	107	95	--	105
	Alternative 1 – 2040	33	30	--	32
	Alternative 2 – 2040	20	19	--	19
	Alternative 3 – 2040	22	--	13	19
-- Lane type does not exist in the alternative.					

Source: Parsons.

Vehicle Hours of Delay. Table 3.1.6-8 presents the daily and annual vehicle hours of delay (VHD) occurring on the freeway on weekdays. VHD is based on the number of additional hours of vehicle travel required within the corridor due to speeds lower than 65 mph on weekdays during peak periods when congestion reduces speeds and increases corridor travel times. Under the existing condition (2009), there are approximately **19,000 daily and 4 million annual VHD** on the freeway.

Table 3.1.6-8: Vehicle Hours of Delay Existing and Years 2020 and 2040 on Weekdays in the Area of Proposed Improvements

Year	Alternative	Daily	Annual
2009	Existing	19,083	4,198,209
2020	No Build	102,984	22,656,558
	Alternative 1	27,435	6,035,662
	Alternative 2	11,824	2,601,251
	Alternative 3	9,958	2,190,791
2040	No Build	413,278	90,921,066
	Alternative 1	146,936	32,326,005
	Alternative 2	65,677	14,449,036
	Alternative 3	57,178	12,579,091

Source: Parsons.

Traffic Accident Data. Traffic accident data for I-405 and interchange ramps for the area of the proposed widening were obtained from Caltrans TASAS Table B for a 3-year period between January 1, 2006, and December 31, 2008. During this 3-year period, there were 2,352 accidents on northbound I-405 and 2,115 accidents on southbound I-405 between Bristol Street PM 9.51 and the Orange/Los Angeles county line PM 24.18, including 1,067 injury accidents and 14 accidents involving fatalities. Actual accident rates in both directions of the entire 14.9 miles of I-405 are lower than the statewide average for similar facilities. The total accident rate was 0.94 accidents per million vehicle miles (mvm) in the northbound direction of I-405 and 0.85 accidents per mvm in the southbound direction, while the statewide average is 1.16 accidents per mvm.

Freeway Connector Volumes. Table 3.1.6-9 provides the existing branch connector volumes on ramps between freeways within the study area in Orange County. Branch connectors are the ramps connecting one freeway to another. The branch connectors at SR-73 have three lanes in each direction. The branch connectors at SR-22 East have three lanes in the eastbound direction and two lanes in the westbound direction. The branch connectors at the SR-22 West (7th Street) and I-605 have two lanes in each direction. Branch connectors operate with v/c ratios ranging from **0.53 to 1.17** under existing conditions.

Arterials, Intersections, and Interchanges

To establish existing (year 2009) traffic conditions for arterial and interchange study locations in Orange County, AM and PM peak-hour turning movement counts were collected. Additionally,

24-hour daily traffic counts were collected on arterials crossing the freeway in both interchange and non-interchange areas. Existing arterial ADT volumes for arterial interchanges and non-interchange overcrossings are summarized in Table 3.1.6-10.

A summary of the LOS analysis and v/c ratios for AM and PM peak hours for existing conditions is provided in Table 3.1.6-1 for all study intersections in Orange County. The study intersections are currently operating at LOS D or better, except for five intersections that are operating at LOS E or F during either the AM or PM peak hour or both.

Table 3.1.6-1 shows that the study intersections are currently operating under capacity (v/c less than 1.00) during peak hours, except for two intersections that are currently operating over-capacity during the PM peak hour.

A comparison of existing vehicle queuing (higher of AM or PM peak-hour 95th percentile queues) with available storage (in feet) was conducted at all arterial interchange study intersections and is summarized in Table 3.1.6-11. The table shows that 91 percent of off-ramps with traffic control at their arterial intersections have adequate turning lane storage under existing conditions. Table 3.1.6-11 also shows that 89 percent of arterials have adequate turning lane storage at ramp intersections and 67 percent of turning lanes at arterial/arterial intersections have adequate storage.

Ramp meter queuing at on-ramps was observed in the field. The interchange of I-405/Brookhurst Street is currently congested during the peak hours due to inadequate capacity on the freeway ramps. During the a.m. peak hour, the constrained capacity of the single lane at the ramp meter along the on-ramp from southbound Brookhurst Street to southbound I-405 results in queues of vehicles on Brookhurst Street waiting to get onto I-405. Similarly, eastbound Talbert Avenue to southbound I-405 is also experiencing queues of vehicles waiting to get on I-405, which is negatively affecting the operations at the Brookhurst Street/Talbert Avenue intersection.

The interchange of I-405/Magnolia Street is heavily congested during the a.m. peak hour. The southbound Magnolia Street traffic to southbound I-405 often queues to north of Heil Avenue, primarily due to constrained capacity of the single lane at the ramp meter along the on-ramp. Often the four-lane Magnolia Street bridge overcrossing is reduced to two travel lanes for the north-south traffic as the curb lanes are stacked with vehicles waiting to get onto I-405. In addition, northbound Magnolia Street narrows from three through lanes to two through lanes just south of the I-405 interchange.

Table 3.1.6-9: 2020 Branch Connector Volumes and Volume-to-Capacity Ratios – Locations in Orange County

Branch Connector	Existing 2009				No Build – 2020				Alternative 1 – 2020				Alternative 2 – 2020				Alternative 3 - 2020			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C
NB GP On from NB SR-73	3,030	0.56	3,610	0.67	3,411	0.63	4,598	0.85	3,411	0.63	4,598	0.85	3,411	0.63	4,598	0.85	2,311	0.64	3,198	0.89
NB Express On from NB SR-73	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		1,100	0.73	1,400	0.93
NB On from WB SR-22	5,260	1.17	4,400	0.98	5,236	1.16	4,601	1.02	5,236	1.16	4,601	1.02	5,236	1.16	4,601	1.02	6,064	1.35	5,706	1.27
NB HOV/Express* On from WB SR-22	N/A		N/A		1,528	1.02	1,805	1.20	1,528	1.02	1,805	1.20	1,528	1.02	1,805	1.20	700	0.47	700	0.47
NB Off to WB SR-22	2,250	0.63	2,000	0.56	2,665	0.74	2,937	0.82	2,665	0.74	2,937	0.82	2,665	0.74	2,937	0.82	2,665	0.74	2,937	0.82
NB Off to NB I-605	3050	0.85	3,750	1.04	2,933	0.81	4,122	1.15	2,933	0.81	4,122	1.15	2,933	0.81	4,122	1.15	2,729	0.76	4,333	1.20
NB HOV/Express* Off to NB I-605	N/A		N/A		1,296	0.86	1,711	1.14	1,296	0.86	1,711	1.14	1,296	0.86	1,711	1.14	1,500	1.00	1,500	1.00
SB GP On from SB I-605	3,776	1.05	3,632	1.01	4,227	1.17	3,549	0.99	4,227	1.17	3,549	0.99	4,227	1.17	3,549	0.99	3,890	1.08	3,030	0.84
SB HOV/Express* On from SB I-605	N/A		N/A		1,163	0.78	981	0.65	1,163	0.78	981	0.65	1,163	0.78	981	0.65	1,500	1.00	1,500	1.00
SB On from EB SR-22	2,067	0.57	2,868	0.80	2,682	0.75	3,017	0.84	2,682	0.75	3,017	0.84	2,682	0.75	3,017	0.84	2,682	0.75	3,017	0.84
SB Off to EB SR-22	5,313	0.98	5,647	1.05	4,615	0.85	4,600	0.85	4,582	0.85	4,555	0.84	4,582	0.85	4,555	0.84	5,221	0.97	5,494	1.02
SB HOV/Express* Off to EB SR-22	N/A		N/A		1,339	0.89	1,639	1.09	1,339	0.89	1,639	1.09	1,339	0.89	1,639	1.09	700	0.47	700	0.47
SB GP Off to SB SR-73	3,315	0.61	2,857	0.53	4,767	0.88	3,616	0.67	4,767	0.88	3,616	0.67	4,767	0.88	3,616	0.67	3,367	0.94	2,416	0.67
SB Express Off to SB SR-73	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		1,400	0.93	1,200	0.80

HOV – High-Occupancy Vehicle; LOS – Level of Service; V/C – Volume-to-Capacity Ratio based on branch connector capacity of 1,800 per lane for GP branch connector lanes and 1,500 per lane for Express Lane direct connectors, which have a single lane in each direction. N/A – Connector does not exist under the alternative.

*For the no-build condition and Alternatives 1 and 2, the connector in this row is managed as an HOV facility. For Alternative 3, the connector in this row is managed as an Express Facility.

Source: Albert Grover & Associates 2011.

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Table 3.1.6-10: Existing (2009)
Arterial and Freeway Crossings Average Daily Traffic Volumes
in the Area of Proposed Improvements

Arterial	Segment Limits	2009 ADT
Bristol Street Interchange at I-405		
Bristol Street	Anton Boulevard to I-405 northbound off-ramp	60,420
	I-405 northbound off-ramp to I-405 southbound ramps	54,910
	I-405 southbound ramps - Paularino Avenue	34,160
Fairview Road Interchange at I-405		
Fairview Road	MacArthur Boulevard to South Coast Drive	40,480
	South Coast Drive to I-405 southbound ramps	51,780
	I-405 southbound ramps to Baker Street	46,660
	Harbor Boulevard and Hyland Avenue interchange at I-405	9,990
South Coast Drive I-405 Northbound On-Ramp to Harbor Boulevard		
South Coast Drive	South Coast Drive to I-405 northbound ramps	56,550
Harbor Boulevard	I-405 northbound ramps to I-405 southbound ramps	44,470
	I-405 southbound ramps to Gisler Avenue	69,580
Euclid Street/Ellis Avenue Interchange at I-405		
Euclid Street/ Ellis Avenue	Talbert Avenue to I-405 northbound ramps/Newhope Street	20,630
	I-405 northbound ramps/Newhope Street to I-405 southbound ramps	28,960
	I-405 southbound ramps to Ward Street	29,140
Brookhurst Street and Talbert Avenue Interchange at I-405		
Brookhurst Street	Slater Avenue to I-405 northbound ramps	52,140
	I-405 northbound ramps to I-405 southbound ramps	55,100
	I-405 southbound ramps to Talbert Avenue	51,760
Talbert Avenue	Bushard Street to Brookhurst Street	27,140
	Brookhurst Street to Ward Street	19,870
Magnolia Street and Warner Avenue Interchange at I-405		
Magnolia Street	Heil Avenue to I-405 northbound on-ramp	37,740
	I-405 northbound on-ramp to I-405 southbound ramps	34,450
	I-405 southbound ramps to Warner Avenue	33,950
Warner Avenue	Magnolia Street to I-405 southbound ramps	44,170
	I-405 southbound ramps to I-405 northbound ramps	38,570
	I-405 northbound ramps to Bushard Street	35,880
Beach Boulevard and Edinger Avenue Interchange at I-405		
Beach Boulevard	McFadden Avenue to I-405 northbound ramps	66,330
	I-405 northbound ramps to I-405 southbound ramps	75,100
	I-405 southbound ramps to Edinger Avenue	73,240
Edinger Avenue	Beach Boulevard to I-405 southbound on-ramp	31,120
	I-405 southbound on-ramp to Newland Street	20,370

Table 3.1.6-10: Existing (2009)
Arterial and Freeway Crossings Average Daily Traffic Volumes
in the Area of Proposed Improvements

Arterial	Segment Limits	2009 ADT
Goldenwest Street and Bolsa Avenue Interchange at I-405		
Goldenwest Street	Sowell Avenue to I-405 northbound on-ramp	28,130
	I-405 northbound on-ramp to I-405 southbound ramps	40,570
Bolsa Avenue	Goldenwest Street to I-405 southbound ramps	41,670
	I-405 northbound ramps to Hoover Street	21,130
Springdale Street and Westminster Avenue Interchange at I-405		
Springdale Street	Meinhardt Road/Navajo Road to I-405 southbound off-ramp	18,980
	I-405 southbound off-ramp to Westminster Avenue	25,310
Westminster Avenue	Springdale Street to I-405 southbound ramps	41,180
	I-405 northbound ramps to Edwards Street	30,400
Bolsa Chica Road/Valley View Street and Garden Grove Boulevard Interchange at I-405		
Garden Grove Boulevard	Valley View Street to I-405 northbound off-ramp/SR-22 eastbound ramps	32,310
Valley View Street	Cerulean Avenue to SR-22 westbound & I-405 northbound ramps	55,610
	SR-22 westbound and I-405 northbound ramps to Garden Grove Boulevard	64,140
Bolsa Chica Road	Garden Grove Boulevard to I-405 southbound ramps	49,950
	I-405 southbound ramps to Old Bolsa Chica Road	47,810
Seal Beach Boulevard Interchange at I-405		
Seal Beach Boulevard	Lampson Avenue to I-405 northbound ramps	46,970
	I-405 northbound ramps to I-405 southbound ramps	44,500
	I-405 southbound ramps to Westminster Avenue	31,950
Bear Street Interchange at SR-73		
Bear Street	Yukon Avenue/Paularino Avenue to SR-73 northbound ramps	15,700
	SR-73 northbound ramps to SR-73 southbound ramps	21,810
	SR-73 southbound ramps to Baker Street	28,650
Katella Avenue Interchange at I-605		
Katella Avenue	West of I-605 southbound off-ramps to I-605 southbound ramps	20,330
	I-605 southbound ramps to I-605 northbound ramps	40,090
	I-605 northbound ramps to Los Alamitos Boulevard	59,070
Freeway Crossings		
Ward Street		9,680
Slater Avenue		16,220
Bushard Street		13,980
Newland Street		16,170
McFadden Avenue		16,720
Edwards Street		16,680

Source: Albert Grover & Associates, 2011.

Table 3.1.6-11: Number of Locations with Adequate Vehicle Storage[1] in 2009 and 2040 – Locations in Orange County

Location	2009 Existing			2040 No Build			2040 Build including Mitigations		
	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage
Off-Ramp at Arterials	30	33	91	26	33	79	41	41	100[2]
Arterials at Ramps	40	45	89	33	45	73	44	51	86
Arterial/Arterial Intersections	47	70	67	35	70	50	56	70	80
On-Ramps at Ramp Meters	N/A	N/A	N/A	27	37	73	36	38	95[3]

[1] Storage is considered adequate if it will contain the 95th percentile queue.

[2] Under the build condition with mitigations, there are no locations where off-ramp queues are expected to back onto the freeway mainline.

[3] Under the build condition with mitigations, there are two on-ramps forecast to have 95th percentile queues that exceed the available storage. Both occur under the no-build condition, so neither is caused by the proposed project. Both are outside the limits of interchange improvements where the only proposed improvements are signing and striping of the freeway transition areas associated with the Express Lanes in Alternative 3.

Source: Albert Grover & Associates, 2011.

The interchange of I-405/Beach Boulevard is currently congested during the peak hours due to inadequate capacity on the freeway ramps. During the p.m. peak hour, the constrained capacity of the single lane at the ramp meter along the on-ramp from northbound Beach Boulevard to northbound I-405 results in queues of vehicles on Beach Boulevard waiting to get onto I-405. Similarly, eastbound Edinger Avenue to southbound I-405 also has long queues of vehicles waiting to get on I-405 during the a.m. peak hour, which negatively affects the operations at the Beach Boulevard/Edinger Avenue intersection.

Pedestrian and Bicycle Facilities

Under existing conditions, there are continuous pedestrian sidewalks and crosswalks along at least one side of most arterials within the limits of the proposed freeway widening and a pedestrian overcrossing at Heil Avenue. Continuous pedestrian facilities (i.e. pedestrian sidewalk and crosswalks) do not currently exist on arterials within the limits of the proposed freeway widening at the following locations:

West side of Harbor Boulevard;

East side of Euclid Street;

East side of Ward Street;

North side of Talbert Avenue;

West side of Brookhurst Street;

North side of Warner Avenue;

East side of Magnolia Street;

East side of Newland Street;

Both sides of Edinger Avenue;

South side of McFadden Avenue;

North side of Bolsa Avenue;

West side of Goldenwest Street;

West side of Edwards Street;

North side of Westminster Avenue;

West side of Springdale Street;

Both sides of Bolsa Chica Road; and

Both sides of Seal Beach Boulevard.

Within the proposed limits of freeway widening, there are two existing Class 1 bikeways, one along the east bank of the Santa Ana River that crosses the freeway beneath the I-405 Santa Ana

River Bridge and the other along the San Gabriel River. Class 1 bikeways are facilities that are devoted to the exclusive use of bikes and do not share their roadway with motor vehicles.

There are six Class 2 bikeways within the proposed limits of freeway widening at the following locations:

Fairview Road;

Ward Street;

Slater Avenue;

Bushard Street;

Edwards Street; and

Seal Beach Boulevard.

Class 2 bikeways share roadways with motorized vehicles, are generally located on roadway shoulders, and are designated by signage and striped bike lanes in areas where bicyclists are directed to avoid shoulders. Class 3 bikeways share travel lanes with motor vehicles and/or pedestrians.

Los Angeles County

Traffic Study Area

The traffic study area within Los Angeles County includes:

I-405 from I-605 to Lakewood Boulevard;

I-605 from Katella Avenue to Carson Street; and

SR-22/7th Street from I-405 to Park Avenue.

The study area in Los Angeles County includes all of the interchanges along I-405 and I-605 within the limits noted above, including arterial/ramp intersections and arterial/arterial intersections in the immediate vicinity of the interchanges. Figure 3.1.6-5 shows the traffic study area within Los Angeles County.

Within the traffic study area in Los Angeles County, 12 freeway segments have been analyzed. These are shown in Figure 3.1.6-5 and include:

1. I-405 between Lakewood Boulevard/Willow Street and Temple Avenue
2. I-405 between Bellflower Boulevard and Lakewood Boulevard/Willow Street
3. I-405 between Woodruff Avenue and Bellflower Boulevard

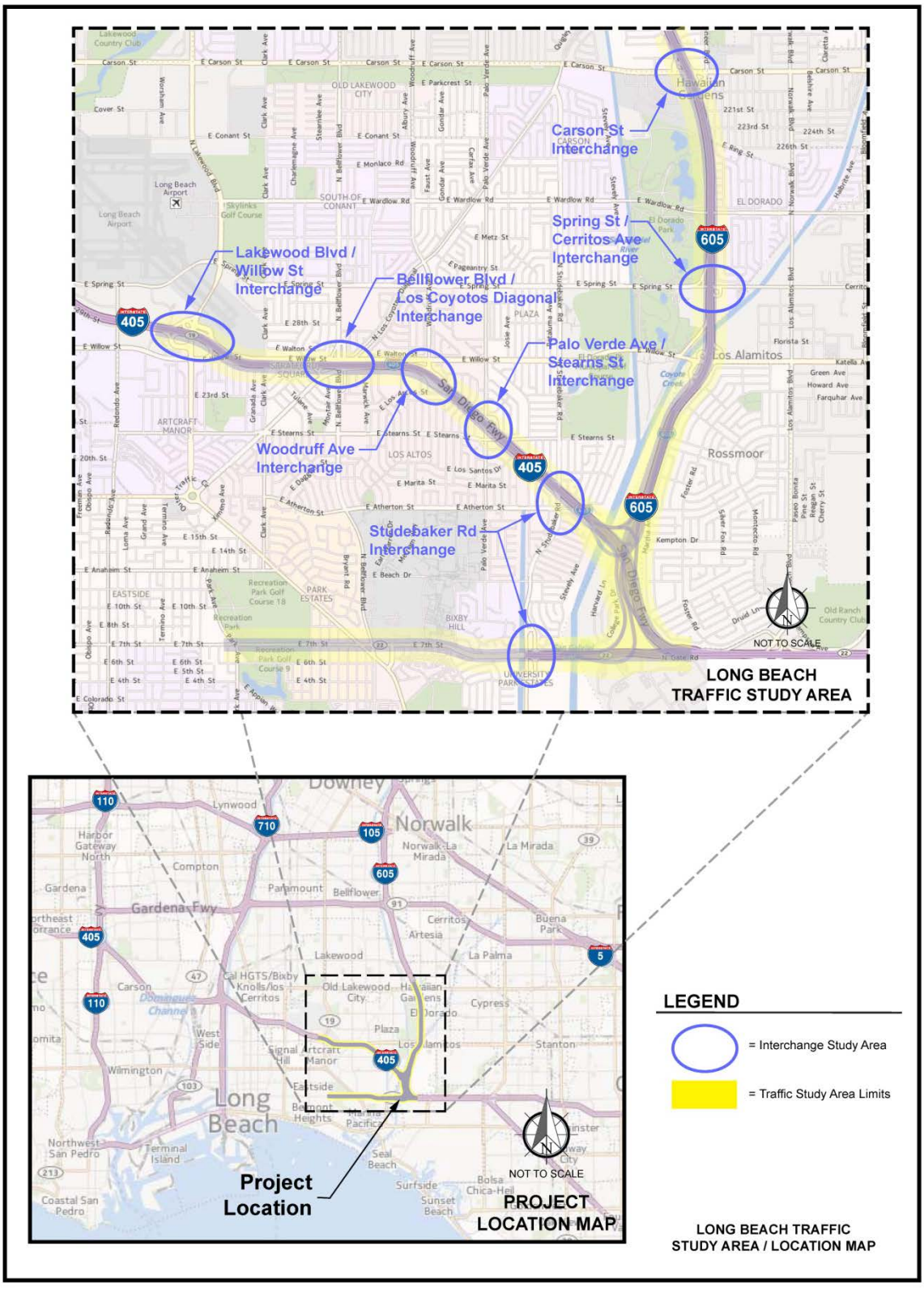

Figure 3.1.6-5: Study Area within Los Angeles County

4. I-405 between Palo Verde Avenue/Stearns Street and Woodruff Avenue
5. I-405 between Studebaker Road and Palo Verde Avenue/Stearns Street
6. I-405 between I-605 and Studebaker Road
7. I-405 between SR-22/7th Street and I-605
8. I-605 between Spring Street/Cerritos Avenue and Carson Street
9. I-605 between Willow Street/Katella Avenue and Spring Street/Cerritos Avenue
10. I-605 between I-405/I-605 and Willow Street/Katella Avenue
11. SR-22/7th Street between Pepper Tree Lane and Studebaker Road
12. SR-22/7th Street between Studebaker Road and I-405/I-605

To simplify the comparison of future conditions and alternatives, the freeways in Los Angeles County were divided into four segments (referred to as "study segments" hereafter): I-405 from Studebaker Road to I-605, I-405 from Studebaker Road to Lakewood Boulevard, I-605 from I-405 to Carson Street, and SR-22/7th Street from Studebaker Road to I-405/I-605 Interchange. This segmentation is generally based on the similarity of lane cross section by segment.

Within the traffic study area in Los Angeles County, the following local interchanges have been analyzed:

1. Carson Street Interchange at I-605
2. Spring Street/Cerritos Avenue Interchange at I-605
3. Lakewood Boulevard and Willow Street Interchange at I-405
4. Bellflower Boulevard and Los Coyotes Diagonal Interchange at I-405
5. Woodruff Avenue Interchange at I-405
6. Palo Verde Avenue and Stearns Street Interchange at I-405
7. Studebaker Road Interchange at I-405
8. Studebaker Road Interchange at SR-22/7th Street
9. 7th Street between Park Avenue and East Campus Drive (includes Pacific Coast Highway at Bellflower Boulevard)

A list of study intersections, grouped by freeway interchange area, is shown in Table 3.1.6-12. Intersections identified for evaluation include those controlled with traffic signals, as well as stop-controlled or uncontrolled intersections within the study area in Los Angeles County.

Existing (Year 2009) Lane Configuration

Existing (year 2009) traffic control and lane geometrics for the freeway mainline and intersections within the study area in Los Angeles County are illustrated in Figures 3.1.6-6 and 3.1.6-7, respectively.

I-405 Mainline. Within the study area in Los Angeles County, I-405 is a controlled-access freeway oriented in a northwest-southeast direction with four GP lanes in each direction. There is one HOV lane in each direction. The HOV lanes are generally separated from the GP lanes with a striped buffer (1 to 4 ft wide).

I-605 Mainline. Within the study area in Los Angeles County, I-605 is a controlled-access freeway oriented in a northeast-southwest direction with four GP lanes in each direction. There is one HOV lane in the northbound direction. The HOV lane is generally separated from the GP lanes with a striped buffer (1 to 4 ft wide).

SR-22/7th Street Mainline. SR-22/7th Street consists of two GP lanes in each direction from Studebaker Road to the I-405/I-605 interchange and is oriented in an east-west direction. There are three GP lanes in each direction west of Studebaker Road.

Carson Street Interchange at I-605. The I-605/Carson Street interchange is a partial cloverleaf interchange with two loop on-ramps in the northwest and southeast quadrants. The intersections of Carson Street/I-605 northbound off-ramp, Carson Street/I-605 southbound off-ramp, and Carson Street/Pioneer Boulevard are currently signalized. All other ramp/arterial intersections are not signalized and provide continuous right turns. Between the two signalized ramp intersections, Carson Street consists of three to four lanes in each direction.

Spring Street/Cerritos Avenue Interchange at I-605. The I-605/Spring Street/Cerritos Avenue interchange is a partial interchange with a northbound loop on-ramp in the southeast quadrant and a southbound tangent off-ramp in the northwest quadrant. The I-605 northbound and southbound ramp intersections with Spring Street/Cerritos Avenue are currently signalized. Between the two ramp intersections, Spring Street/Cerritos Avenue consists of two to three lanes in each direction.

Lakewood Boulevard/Willow Street Interchange at I-405. The I-405/Lakewood Boulevard/ Willow Street interchange is a cloverleaf interchange with a tangent on-ramp located on Willow Street. The intersection of Lakewood Boulevard/Willow Street is signalized. All other ramp/arterial intersections are not signalized and provide continuous right turns. Between the ramp intersections along Lakewood Boulevard, Lakewood Boulevard is an eight-lane roadway.

Table 3.1.6-12: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for Alternative 1 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020												Year 2040											
					Existing Traffic						No Build Traffic on No Build Geometry						Alternative 1 Traffic on No Build Geometry						No Build-Alternative 1 Adverse Effect	No Build Traffic on No Build Geometry						Alternative 1 Traffic on No Build Geometry						No Build-Alternative 1 Adverse Effect
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
		East/West Street	North/South Street		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.56	18.7	B	0.67	20.1	C	N	0.62	22.4	C	0.73	24.5	C	0.61	18.8	B	0.73	20.8	C	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.38	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.41	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.35	--	--	0.36	--	--	--	0.35	--	--	0.36	--	--	0.38	--	--	0.39	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.59	20.3	C	0.76	16.6	B	N	0.63	23.6	C	0.82	23.2	C	0.63	21.8	C	0.82	18.4	B	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.30	--	--	0.35	--	--	--	0.33	--	--	0.37	--	--	0.33	--	--	0.37	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--
	4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.79	30.7	C	0.87	31.6	C	N	0.86	35.1	D	0.92	43.9	D	0.87	34.7	C	0.90	41.4	D	N
Spring Street/ Cerritos Avenue at I-605	5	Spring Street/Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.68	14.0	B	0.64	10.3	B	N	0.74	15.4	B	0.71	12.0	B	0.73	15.2	B	0.70	11.4	B	N
	6	Spring Street/Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.73	9.3	A	0.78	8.1	A	N	0.82	11.6	B	0.86	9.8	A	0.79	10.3	B	0.85	9.5	A	N
Lakewood Boulevard/ Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.43	--	--	0.41	--	--	--	0.41	--	--	0.41	--	--	0.47	--	--	0.44	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.38	--	--	0.22	--	--	--	0.41	--	--	0.25	--	--	0.41	--	--	0.24	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.26	--	--	0.22	--	--	--	0.25	--	--	0.23	--	--	0.28	--	--	0.24	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.53	--	--	0.41	--	--	--	0.57	--	--	0.44	--	--	0.57	--	--	0.44	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.23	--	--	0.25	--	--	--	0.24	--	--	0.27	--	--	0.25	--	--	0.27	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.41	--	--	0.46	--	--	--	0.46	--	--	0.52	--	--	0.44	--	--	0.50	--	--	--
	9	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	**0.92**	**66.2**	**E**	0.75	31.2	C	0.89	43.0	D	0.74	28.9	C	0.96	46.5	D	N	0.81	33.6	C	0.93	48.4	D	0.79	33.1	C	0.93	48.7	D	N
	10	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.33	--	--	0.45	--	--	--	0.37	--	--	0.50	--	--	0.36	--	--	0.48	--	--	--
		Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.28	--	--	0.41	--	--	--	0.31	--	--	0.44	--	--	0.31	--	--	0.44	--	--	--
Bellflower Boulevard/ Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.51	10.4	B	0.53	10.9	B	N	0.55	11.6	B	0.58	11.3	B	0.55	11.3	B	0.58	11.3	B	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.51	--	--	0.37	--	--	--	0.57	--	--	0.40	--	--	0.55	--	--	0.40	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.29	--	--	0.19	--	--	--	0.33	--	--	0.20	--	--	0.32	--	--	0.20	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	**0.84**	**81.2**	**F**	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	1.00	50.1	D	1.00	51.2	D	N	**1.09**	**67.3**	**E**	**1.09**	**70.6**	**E**	**1.09**	**68.2**	**E**	**1.10**	**68.1**	**E**	N
	13	Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	**0.97**	**72.8**	**E**	0.65	26.4	C	1.00	42.1	D	0.64	27.5	C	1.06	44.6	D	N	0.70	26.9	C	**1.13**	**56.8**	**E**	0.70	28.1	C	**1.15**	**59.4**	**E**	Y
		Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.08	--	--	0.12	--	--	--	0.07	--	--	0.13	--	--	0.08	--	--	0.13	--	--	--
	14	I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.29	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.32	--	--	--
	15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.52	10.3	B	0.47	14.0	B	N	0.56	10.6	B	0.51	16.8	B	0.56	10.8	B	0.51	14.7	B	N
		Los Coyotes Diagonal	I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.25	--	--	0.17	--	--	--	0.18	--	--	0.18	--	--	0.27	--	--	0.18	--	--	--
	16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	**0.74**	**102.8**	**F**	0.78	44.4	D	1.02	35.1	D	0.77	31.7	C	1.04	36.7	D	N	0.87	48.8	D	1.18	45.4	D	0.86	36.4	D	1.20	50.4	D	N
Woodruff Avenue at I-405	17	Willow Street	Woodruff Avenue	Sig	**1.07**	**86.8**	**F**	0.77	30.4	C	**1.33**	**147.9**	**F**	0.87	40.4	D	**1.32**	**146.2**	**F**	0.88	40.9	D	N	**1.44**	**180.5**	**F**	0.94	51.5	D	**1.43**	**179.2**	**F**	0.94	53.1	D	N
	18	I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.39	--	--	0.20	--	--	--	0.42	--	--	0.20	--	--	0.43	--	--	0.22	--	--	--
		I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.31	--	--	0.21	--	--	--	0.34	--	--	0.23	--	--	0.34	--	--	0.23	--	--	--
	19	I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.51	--	--	0.45	--	--	--	0.56	--	--	0.51	--	--	0.55	--	--	0.49	--	--	--
		I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.43	--	--	0.23	--	--	--	0.45	--	--	0.25	--	--	0.47	--	--	0.25	--	--	--
Palo Verde Avenue/ Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.78	17.0	B	0.63	12.0	B	N	0.95	21.2	C	0.70	12.6	B	0.96	20.6	C	0.73	13.1	B	N
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.15	--	--	0.20	--	--	--	0.14	--	--	0.23	--	--	0.17	--	--	0.21	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	**0.87**	**86.6**	**F**	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.84	12.9	B	0.68	10.2	B	N	0.91	15.9	B	0.72	11.3	B	0.91	15.4	B	0.74	11.2	B	N
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.86	18.5	B	0.85	21.0	C	N	0.94	22.0	C	0.92	24.4	C	0.94	21.7	C	0.93	25.1	C	N
	23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.33	--	--	0.44	--	--	--	0.33	--	--	0.50	--	--	0.35	--	--	0.48	--	--	--

Table 3.1.6-12: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for Alternative 1 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location: East/West Street	Intersection Location: North/South Street	Traffic Control	Year 2009: Existing Traffic: AM Peak Hour: V/C	Year 2009: Existing Traffic: AM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: AM Peak Hour: LOS	Year 2009: Existing Traffic: PM Peak Hour: V/C	Year 2009: Existing Traffic: PM Peak Hour: Avg Delay (sec)	Year 2009: Existing Traffic: PM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2020: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2020: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2020: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2020: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2020: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2020: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2020: No Build-Alternative 1 Adverse Effect	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2040: No Build Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2040: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: D/C	Year 2040: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 1 Traffic on No Build Geometry: AM Peak Hour: LOS	Year 2040: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: D/C	Year 2040: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: Avg Delay (sec)	Year 2040: Alternative 1 Traffic on No Build Geometry: PM Peak Hour: LOS	Year 2040: No Build-Alternative 1 Adverse Effect
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.51	1.2	A	0.50	3.1	A	N	0.55	2.8	A	0.51	4.9	A	0.55	1.4	A	0.54	3.2	A	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop	0.15	13.8	B	0.04	10.8	B	**0.86**	**68.4**	**F**	0.34	16.2	C	**1.03**	**113.3**	**F**	0.51	24.8	C	N	**1.02**	**98.3**	**F**	0.33	15.7	C	**1.24**	**170.6**	**F**	0.53	25.2	D	N
				*Sig**	*N/A*						*0.65*	*8.4*	*A*	*0.66*	*5.8*	*A*	*0.66*	*8.9*	*A*	*0.65*	*6.2*	*A*		*0.71*	*9.1*	*A*	*0.72*	*7.0*	*A*	*0.72*	*9.8*	*A*	*1.72*	*7.1*	*A*	
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.54	10.3	B	0.79	14.8	B	N	0.60	10.7	B	0.85	15.7	B	0.58	11.1	B	0.86	16.9	B	N
Studebaker Road at SR-22/ 7th Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.53	13.0	B	0.76	27.3	C	N	0.50	13.1	B	0.86	30.4	C	0.52	13.5	B	0.82	29.1	C	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.97	28.9	C	0.96	28.6	C	N	0.99	30.4	C	1.03	37.1	D	1.05	43.5	D	1.06	40.4	D	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop	0.39	18.8	C	**0.65**	**59.9**	**F**	0.43	21.3	C	**0.61**	**88.7**	**F**	0.51	24.3	C	**0.73**	**104.8**	**F**	Y	0.51	25.3	D	**0.84**	**152.1**	**F**	0.61	30.2	D	**1.00**	**184.2**	**F**	Y
				*Sig**	*N/A*						*0.65*	*14.1*	*B*	***1.07****	***110.1***	***F****	*0.70*	*15.1*	*B*	***1.10****	***119.9***	***F****		*0.71*	*15.5*	*B*	***1.16****	***147.2***	***F****	*0.75*	*17.3*	*B*	***1.19****	***156.9***	***F****	
7th Street	30	7th Street	Pacific Coast Highway	Sig	**0.95**	**92.9**	**F**	**1.03**	**82.6**	**F**	0.94	49.2	D	0.95	35.9	D	0.96	53.2	D	0.96	37.4	D	N	**1.02**	**65.8**	**E**	**1.03**	**58.7**	**E**	**1.04**	**71.5**	**E**	**1.04**	**62.4**	**E**	Y
	31	7th Street	Bellflower Boulevard	Sig	**1.01**	**73.6**	**E**	**0.91**	**90.3**	**F**	**1.04**	**68.9**	**E**	0.98	47.9	D	**1.06**	**71.4**	**E**	0.96	42.8	D	Y	**1.13**	**82.4**	**F**	**1.06**	**63.0**	**E**	**1.14**	**84.9**	**F**	**1.04**	**57.2**	**E**	N
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.50	36.6	D	0.69	19.5	B	N	0.57	39.1	D	0.82	32.1	C	0.54	36.9	D	0.81	32.0	C	N
	33	7th Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.74	23.2	C	0.95	25.6	C	N	0.77	25.7	C	1.02	50.8	D	0.80	24.3	C	**1.03**	**55.3**	**E**	N
	34	7th Street	W. Campus Drive	Sig	**0.83**	**112.9**	**F**	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.79	33.2	C	0.82	35.6	D	N	0.85	53.1	D	**0.87**	**58.5**	**E**	**0.86**	**55.3**	**E**	**0.89**	**64.3**	**E**	Y
	35	7th Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.03	38.0	D	0.88	14.9	B	N	**1.12**	**55.8**	**E**	0.96	16.7	B	**1.13**	**58.6**	**E**	0.97	17.2	B	N
	36	7th Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.76	14.4	B	0.83	20	B	N	0.82	17.1	B	0.86	23.7	C	0.82	16.4	B	0.87	24.8	C	N

Notes:

1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
2. * = Intersection is not signalized under existing or No Build conditions. The signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric. The number of LOS E or F locations and the number of locations with V/C or D/C greater than 1.00 identified in the text does not include the signalized row because the existing and no-build operation is based on the current stop control.
3. Bold indicates an intersection forecast to operate at LOS E or F.
4. Shaded cells indicate an adverse effect.
5. -- = LOS and average delay are not calculated for intersections without traffic control. The adverse effect determination applies only to controlled intersections.
6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
7. For future conditions, the D/C ratio is used instead of the V/C ratio.

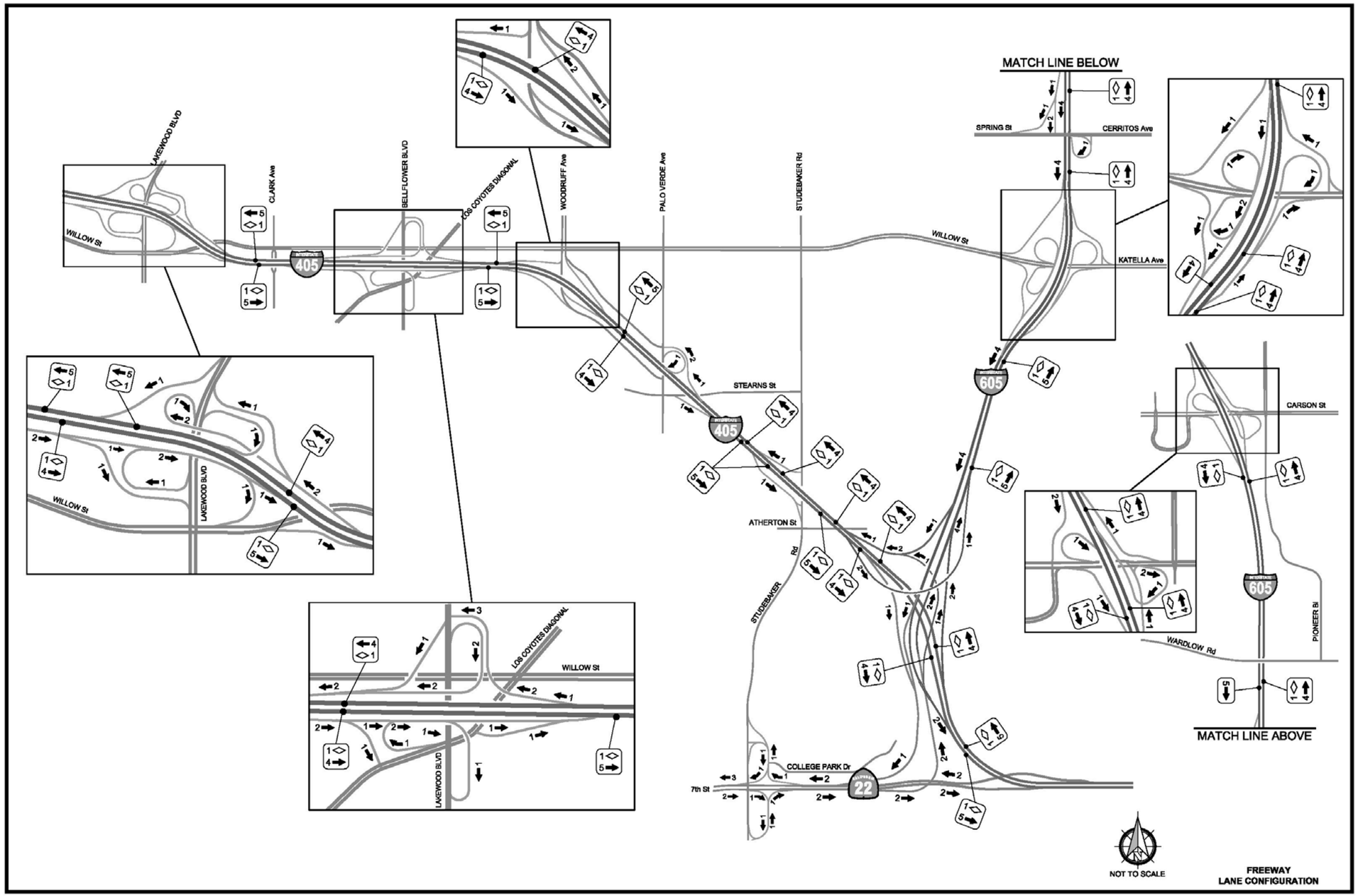

Figure 3.1.6-6: Study Area Freeway Lane Configuration – Locations in Los Angeles County

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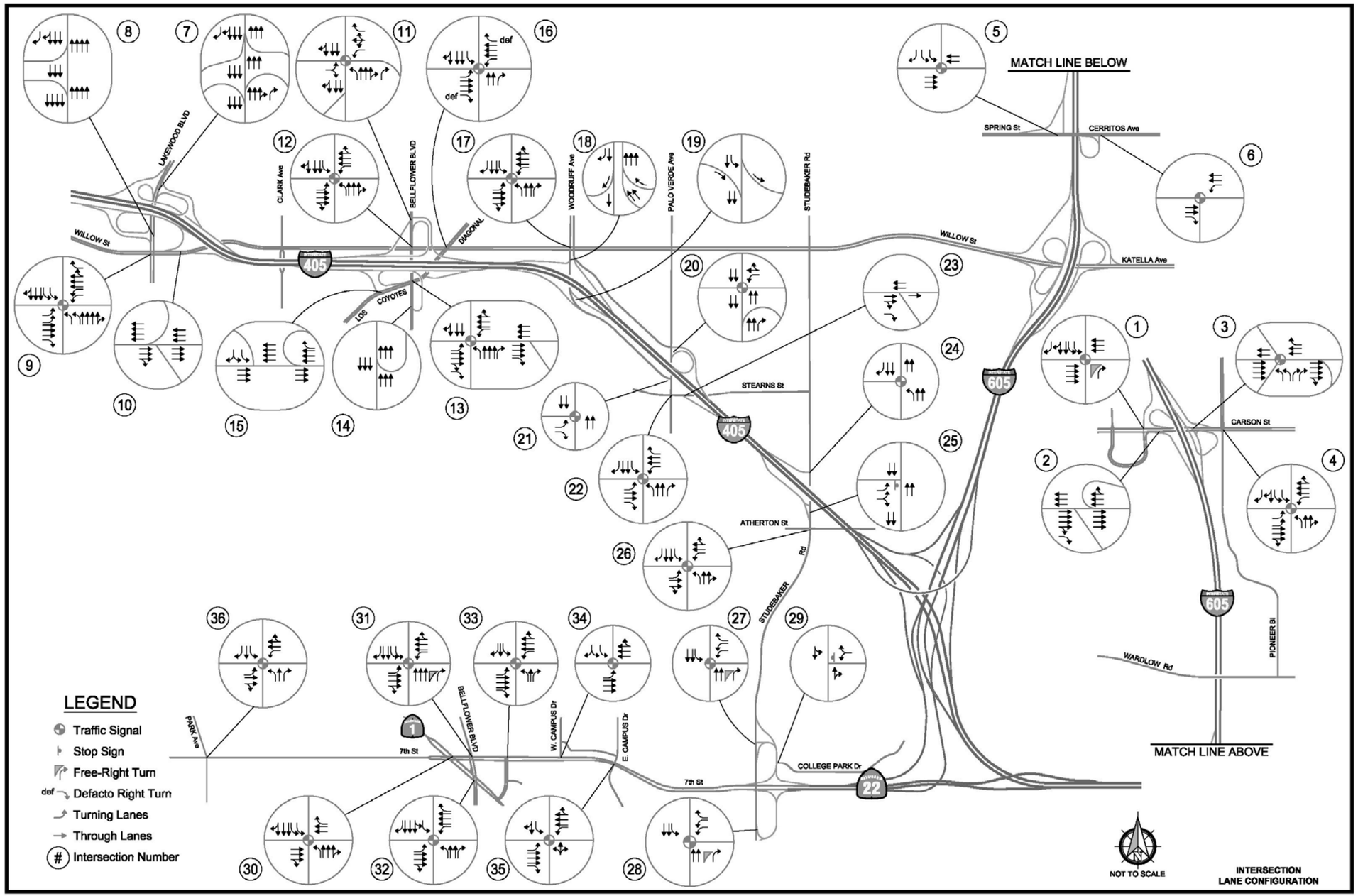

Figure 3.1.6-7: Study Area Intersection Lane Configuration – Locations in Los Angeles County

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Bellflower Boulevard/Los Coyotes Diagonal Interchange at I-405. The I-405/Bellflower Boulevard/Los Coyotes Diagonal interchange is currently a partial cloverleaf interchange with ramps located on Bellflower Boulevard and Los Coyotes Diagonal. The intersections of Bellflower Boulevard/I-405 northbound ramps, Bellflower Boulevard/Willow Street, Bellflower Boulevard/Los Coyotes Diagonal, Los Coyotes Diagonal/I-405 southbound off-ramp, and Los Coyotes Diagonal/Willow Street are currently signalized intersections. All other ramp/arterial intersections are not signalized and provide continuous right turns. Bellflower Boulevard, Willow Street, and Los Coyotes Diagonal within the interchange are six-lane roadways.

Woodruff Avenue Interchange at I-405. The I-405/Woodruff Avenue interchange is a diamond interchange. None of the ramp intersections are signalized. The intersection of Woodruff Avenue and Willow Street is signalized. Woodruff Avenue within the interchange consists of one lane in each direction.

Palo Verde Avenue/Stearns Street Interchange at I-405. The I-405/Palo Verde Avenue/Stearns Street interchange is a partial interchange with two tangent off-ramps, a northbound loop on-ramp, and a tangent on-ramp located on Stearns Street. The I-405 northbound ramp at Palo Verde Avenue, I-405 southbound ramp at Palo Verde Avenue, and Stearns Street at Palo Verde Avenue are currently signalized. In between the two ramp intersections with Palo Verde Avenue, Palo Verde Avenue is a four-lane roadway.

Studebaker Road Interchange at I-405. The I-405/Studebaker Road interchange is a partial interchange with one northbound tangent on-ramp and one southbound tangent ramp. The intersections of I-405 northbound on-ramp/Studebaker Road and Atherton Street/Studebaker Road are currently signalized. The I-405 southbound off-ramp/Studebaker Road intersection is currently stop sign controlled for ramp traffic. All other ramp/arterial intersections are not signalized and provide continuous right turns. In between the two ramp intersections with Studebaker Road, Studebaker Road is a four-lane roadway.

Studebaker Road Interchange at SR-22/7th Street. The SR-22/7th Street interchange at Studebaker Road consists of two tangent ramps and two loop ramps. The ramp intersections of Studebaker Road/SR-22/7th Street westbound and eastbound ramps are currently signalized. In between the two ramp intersections with Studebaker Road, Studebaker Road is a four-lane roadway.

7th Street between Pacific Coast Highway and East Campus Drive. 7th Street between Pacific Coast Highway and East Campus Drive is currently a six-lane roadway. Pacific Coast Highway, Bellflower Boulevard, Channel Drive, West Campus Drive, and East Campus Drive at their

intersections with 7th Street are currently signalized intersections. The intersection of Pacific Coast Highway and Bellflower Boulevard is also currently signalized.

Existing (Year 2009) Traffic Conditions

Existing traffic data for the traffic study area in Los Angeles County are for the year 2009. Traffic data and the results of operational analysis are presented below for the existing (2009) condition for both the freeway mainline and the interchange areas.

Freeway Mainline

Existing (year 2009) traffic volumes for the mainline freeway were obtained from Caltrans PeMS data and Caltrans-published traffic volumes data available on the Caltrans Web site (http://traffic-counts.dot.ca.gov). Existing (year 2009) AM and PM peak-hour traffic volumes for the I-405 mainline and all interchange ramps within the study area in Los Angeles County are illustrated in Figure 3.1.6-8.

V/C Ratio and LOS. Table 3.1.6-13 presents the LOS and v/c ratios for peak hours of the existing year (2009) in the GP lanes of the freeway mainline. Under existing conditions, the I-405 mainline between I-605 and Lakewood Boulevard operates at LOS E and F in the AM peak hour in the northbound direction and LOS D and E in the southbound direction. In the PM peak hour, the I-405 freeway mainline is LOS D and E in the northbound direction and LOS D and F in the southbound direction. The range of v/c ratios in the GP lanes of the I-405 freeway mainline during the AM peak hour is **0.85 to 0.98** and **0.81 to 0.90** during the PM peak hour.

The I-605 mainline operates at LOS C in the AM peak hour in the northbound direction and LOS E in the southbound direction under existing conditions. In the PM peak hour, the I-605 freeway mainline is LOS E in both directions. The v/c ratios in the GP lanes of the I-605 freeway mainline during the AM peak hour are **0.81** in the northbound direction and **1.09** in the southbound direction. During the PM peak hour, the v/c ratios are **0.97** in the northbound direction and **1.00** in the southbound direction.

The SR-22/7th Street freeway mainline operates at LOS D in the AM peak hour in the eastbound and westbound directions under existing conditions. In the PM peak hour, the SR-22/7th Street freeway mainline is LOS E in the eastbound direction and LOS C in the westbound direction. The v/c ratios in the GP lanes of the SR-22/7th Street freeway mainline during the AM peak hour are **0.86** in the eastbound direction and **1.00** in the westbound direction. During the PM peak hour, the v/c ratios are **1.05** in the eastbound direction and **0.71** in the westbound direction.

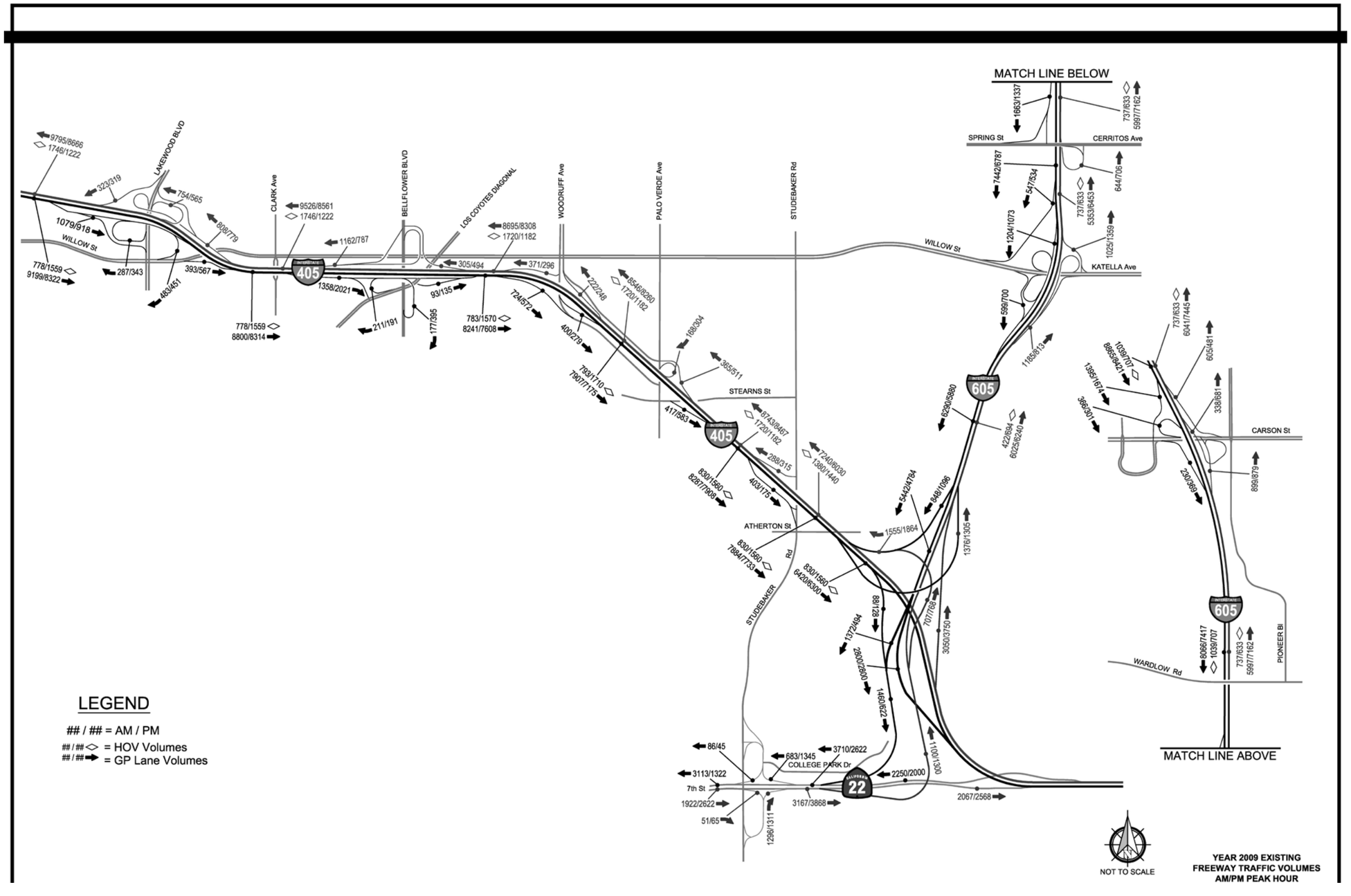

Figure 3.1.6-8: Existing (2009) Freeway Traffic Volumes for AM/PM Peak Hour – Locations in Los Angeles County

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Table 3.1.6-13: Mainline GP Lane Density, LOS, and Volume-to-Capacity Ratio for Year 2020 – Locations in Los Angeles County

Segment	Direction	Existing 2009						No Build – 2020*						Alternative 1 – 2020*						Alternative 2 – 2020*						Alternative 3 – 2020*					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		V/C	Den	LOS	V/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS
I-405 Mainline I-605 to Studebaker Road	NB	0.98	38.2	E	0.81	26.9	D	1.16	**	F	1.29	**	F	1.19	**	F	1.40	**	F	1.20	**	F	1.37	**	F	1.23	**	F	1.42	**	F
	SB	0.85	26.6	D	0.84	31.9	D	0.92	29.7	D	0.98	38.5	E	0.94	30.7	D	0.98	38.5	E	0.94	30.7	D	0.99	38.9	E	0.97	32.2	D	1.02	41.1	E
I-405 Mainline Studebaker Road to Lakewood Boulevard	NB***	0.94	52.4	F	0.90	38.1	E	0.90	51.5	F	1.02	45.2	F	0.92	52.6	F	1.10	49.7	F	0.92	52.4	F	1.07	47.8	F	0.95	55.0	F	1.11	50.3	F
	SB***	0.95	42.0	E	0.90	61.6	F	1.00	45.2	F	1.05	71.1	F	1.01	45.3	F	1.08	75.7	F	1.01	45.4	F	1.04	70.9	F	1.03	46.4	F	1.08	73.4	F
I-605 Mainline I-405 to Carson Street	NB	0.81	26.3	C	0.97	35.7	E	0.80	25.8	C	1.00	37.9	E	0.83	27.0	D	1.01	38.5	E	0.75	24.1	C	0.88	31.3	D	0.78	25.0	C	0.88	31.5	D
	SB	1.09	41.1	E	1.00	36.1	E	1.05	37.7	E	0.98	35.0	D	1.07	39.1	E	1.00	36.1	E	1.08	40.4	E	1.00	36.0	E	1.04	37.4	E	1.03	37.8	E
SR-22/ 7th Street Mainline Studebaker Road to I-405/I-605	EB	0.86	26.1	D	1.05	35.6	E	1.19	**	F	1.08	38.4	E	1.19	**	F	0.98	31.8	D	1.18	**	F	0.95	30.4	D	1.12	41.3	E	0.96	30.8	D
	WB	1.00	33.0	D	0.71	21.1	C	1.06	36.4	E	1.05	36.2	E	1.15	43.9	E	1.09	38.8	E	1.14	42.9	E	1.11	40.9	E	1.11	40.9	E	1.31	**	F

NB – Northbound; SB – Southbound; EB – Eastbound; WB – Westbound; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume–to-Capacity Ratio.

* – For future conditions, the D/C ratio is used instead of the V/C ratio.

** – Density is not calculated under HCM because volume exceeds the range of the density algorithm.

*** – Density and LOS is based on weaving analysis.

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